U.S. DEPARTMENT OF COMMERCE
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PB-263 300

Tunnel Component of the Tunnel & Reservoir Plan (TARP) Proposed by the Metropolitan Sanitary District of Greater Chicago. Mainstream Tunnel System, 59th St to Addison St

Environmental Protection Agency, Chicago, Illinois. Region V

May 76

3[redacted]

PB 263 300

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

REGION 5
230 S. DEARBORN ST.
CHICAGO, ILLINOIS 60604

MAY 1976

ENVIRONMENTAL IMPACT STATEMENT

FINAL

TUNNEL COMPONENT OF THE TUNNEL AND RESERVOIR PLAN PROPOSED BY THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

MAINSTREAM TUNNEL SYSTEM 59th. STREET TO ADDISON STREET

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May 76

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7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

Environmental Protection Agency
Chicago, Illinois
Region V

10. Project/Task/Work Unit No.

11. Contract/Grant No.

12. Sponsoring Organization Name and Address

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On March 5, 1976 The Environmental Protection Agency, Region 5, Chicago, Illinois issued a draft environmental impact statement (EIS) on the MSDGC tunnel and reservoir plan (TARP) for Chicago, Illinois. Contained herein are revisions to the draft EIS, which are based upon comments from interested parties or further EPA information. Included are the comments received, EPA responses to these comments, and substitute or additional language to be inserted in the EIS. This document, appended to the draft EIS, constitutes the final environmental impact statement.

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FINAL ENVIRONMENTAL IMPACT STATEMENT

FOR THE

TUNNEL COMPONENT OF THE TUNNEL AND RESERVOIR PLAN (TARP) PROPOSED BY THE METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO

MAINSTREAM TUNNEL SYSTEM
59th STREET TO ADDISION STREET

Prepared By
United States Environmental Protection Agency
Region V
Chicago, Illinois 60604

May 1976

Approved by:

George R. Alexander, Jr.
Regional Administrator

PREAMBLE DOCUMENT

To All Interested Government Agencies and Public Groups:

On March 5, 1976 The Environmental Protection Agency, Region V, Chicago, Illinois issued a draft Environmental Impact Statement (EIS) on the following project:

MSDGC Tunnel and Reservoir Plan (TARP)
Construction Grant Application
Chicago, Cook County, Illinois

That EIS was filed with the Council on Environmental Quality and circulated for review among various Federal and State agencies with expertise in the matters therein and made available to the public.

Contained herein are revisions to the draft EIS, ~~described~~ above. These revisions, which are based upon comments from interested parties or further EPA information, include the comments received, EPA responses to these comments, and substitute or additional language to be inserted in the EIS.

This document, when appended or inserted into the draft EIS ~~described~~ above, shall constitute the final environmental impact statement in accordance with the Guidelines of Council on Environmental Quality, 40 CFR 1500, and with EPA Regulations, 40 CFR 6.

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- 11.2.4 Local

Revisions to the Draft
- ERRATA
- New Pages

XI. GOVERNMENT AND PUBLIC COMMENTS

XI. GOVERNMENT AND PUBLIC COMMENTS

This chapter presents a summary of the issues raised by the reviewers of the Draft EIS for the Mainstream Tunnel system, 59th Street to Addision Street segment of TARP. The EIS reviewers included representatives of Federal, State, and local government agencies as well as individuals from civic and public service organizations, industry, and citizen groups. Written comments submitted by these reviewers and EPA responses are also included in this chapter.

11.1 MAJOR ISSUES RAISED BY COMMENTS

The issues are grouped into four general environmental areas and are discussed in the following sections.

- Groundwater and Surface Water
- Waste Disposal
- Ecology
- Other Issues.

11.1.1 GROUNDWATER AND SURFACE WATER

One of the major concerns was whether TARP would deplete groundwater resources as a result of infiltration or whether TARP wastewaters would eventually pollute groundwater aquifers. Also, what has been done to ensure that there will be no exfiltration from the reservoirs to the groundwater supplies was asked. Another question asked was what is the origin of water for recharging the wells. These concerns have been addressed in sections 5.1.2 and 10.1.4 of the EIS. A grouting program, a groundwater protection program, and an infiltration/exfiltration monitoring program will be implemented in TARP.

Since a grouting program will be implemented, one concern was that if extensive grouting is done to certain portions of the tunnel, an extensive grouted zone could result and possibly constitute a significant negative boundary, the effects of which should be evaluated in the EIS. The groundwater monitoring program described in Section 10.1.4 of the EIS will provide a means to monitor or evaluate the effects of grouting and the extent grout material will permeate subsurface soils of the area.

An adequate assessment of the likelihood of degradation or contamination of the upper aquifer was requested, since treatment plants may be inadequate and water may be stored in the tunnels longer than planned. A discussion of the decrease of piezometric, or hydraulic, pressure level of the upper aquifer due to infiltration was felt to be critical, especially if the reservoirs are not built. Section 8.1.2 of the EIS discusses the effects of infiltration and exfiltration due to the implementation of TARP. The effects discussed assume a "worst case" condition.

Another question concerned whether the water, once treated, will be used to recharge the upper aquifer or used to replenish the lake, and also, what will be the effect of TARP on lake outfalls. As indicated in part (4) of EIS Section 5.1.2, water used to recharge aquifers must be equivalent to "potable" water. One EIS reviewer felt a discussion of what flood protection benefits TARP would provide to be necessary. Although flood protection benefits are an important aspect to consider, the purpose of the EIS is to address only those aspects that are relevant to pollution control since the EPA's construction grant will apply only to the pollution control systems of TARP.

An alternative wastewater treatment method was proposed and will be evaluated further by the EPA-Region V staff. The method proposed is: to gradually remove the dams built on the Des Plaines River and to create floodplains to treat the wastewater naturally.

A statement of TARP's relations to other plans in the watershed, such as the Des Plaines Floodwater Management Plan was requested. This issue will be addressed in the Lower Des Plaines EIS, which is currently in the development stage.

11.1.2 WASTE DISPOSAL

These issues centered on the method of spoil (rock and sludge) disposal. It was felt that the spoil disposal sites were not specifically described. There was concern that the sites should avoid such areas as wetlands, timbered areas, or areas rich with wildlife habitats. It was requested that spoil not be disposed of in Lake Michigan as lakefill and also, that a high spoil pile at McCook Quarry not interfere with the FAA McCook Air Route Surveillance Radar facility. It was also pointed out that Stearns Quarry is not inactive; it is used by the Bureau of Sanitation for incinerator ash disposal.

It was stated that construction vehicles used for disposing TARP spoil material and at construction sites should be required to take and pass the Chicago Department of Environmental Control's emission test. Calculation of the energy consumption potential of constructing the tunnel project was requested; in particular, energy required in the excavation and transportation of spoil from the tunnel should be calculated.

In response to the waste or spoil disposal comments, the EPA will require the MSDGC to define and establish rock and spoil disposal alternative plans. From these alternative plans, environmental implications can be assessed and evaluated. This requirement will be a condition in the EPA's construction grant. With respect to the energy consumption comment, Section 7.6 of the EIS has been revised to include an estimate of total energy consumed during construction of TARP and the approximate amount of coal this energy represents.

11.1.3 ECOLOGY

Concern was expressed over the effects of TARP on wetland recharge and the effects of TARP surface construction on fish and wildlife resources. Measures to ensure wetland recharge from surface runoff were requested, including adverse impacts of collecting and controlling surface storm water, of ground infiltration, and wastewater exfiltration on surface water levels and water quality of wetlands. Most of the fish and wildlife resources of the Chicago area are associated with the Calumet and Lower Des Plaines tunnel systems of TARP. The effects of TARP on these resources will be addressed in the EIS's for these systems. The health hazard of airborne viruses from sewage treatment plants constructed adjacent to residential areas should be considered.

It was stated that fecal coliform and fecal streptococci tests should be done with millipore filters rather than MPN tests.

11.1.4 OTHER ISSUES

Several comments or questions were raised by reviewers concerning issues which do not fall into any of the general environmental areas identified. These issues include:

- Methods to investigate and protect any archaeological resources discovered .

- Details of an inspection program for monitoring tunnel stability
- Consideration of TARP potentially encouraging area growth
- Worst case economic consequences if there is lack of Federal financing of the entire plan, and the resulting burden to taxpayers and users
- Coordination of waste treatment facility construction with the land use planning and regulation required under sections 207 and 303
- Cost comparisons among the alternatives; the possible interconnection between Upper and Lower Des Plaines TARP Tunnels
- Increased processing capacity need as compared to tunnel retention alone.
- The comparison of the first-flush retention alternative with other alternatives.

Most of the issues described in this section will be taken into consideration by the EPA, the MSDGC, and MSDGC subcontractors during the construction and operation phases of TARP. Issues relevant to the Des Plaines or Calumet tunnel systems will be addressed in the EIS's for those systems.

11.2 REVIEWERS' COMMENTS

The written comments submitted by the reviewers are grouped into the following sections:

- Federal
- State
- Regional
- Local.

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11.2.1 Federal

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT. CORPS OF ENGINEERS
219 SOUTH DEARBORN STREET
CHICAGO. ILLINOIS 60604

NCCOD-P

26 April 1976

U.S. Environmental Protection Agency
Region V
ATTN: Planning Branch-E.I.S. Preparation Section
230 South Dearborn Street
Chicago, Illinois 60604

Gentlemen:

Thank you for the opportunity to comment on the TARP Draft E.I.S.

I have the following comments and/or questions:

a. What is the origin of the water for re-charging the wells?

b. What has been done to show that there will be no exfiltration from the reservoirs to the groundwater supplies?

c. There is no need to do total bacteria and coliform (MPN) tests. Also, fecal coliform and fecal streptococci should be done with millipore filters rather than MPN, as per the 14th Edision of the Standard Methods for the examination of water and wastewater.

Thank you again for the opportunity to comment on this E.I.S.

Sincerely yours,

JAMES P. JONES
Chief, Operations Division

United States Department of the Interior

OFFICE OF THE SECRETARY
NORTH CENTRAL REGION
230 S. DEARBORN STREET, 32nd FLOOR
CHICAGO, ILLINOIS 60604

ER 76/226 April 28, 1976

Mr. George R. Alexander, Jr.
Regional Administrator
Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Alexander:

This is in response to your March 5 request for Department of the Interior comments on the draft environmental statement for the Tunnel Component of the Tunnel and Reservoir Plan proposed by the Metropolitan Sanitary District of Greater Chicago.

Fish and Wildlife Resources

One of our continuing concerns regarding the Tunnel and Reservoir Plan has been effects on wetland recharge. Measures to insure wetland recharge from surface runoff should be indicated. The statement should describe the adverse impacts of collecting and controlling surface storm water, of ground infiltration, and wastewater exfiltration on surface-water levels and water quality of wetlands. The subsequent impacts on fish and wildlife resources, if any, are not addressed in the draft statement. An adequate discussion of this and of the fish and wildlife effects of surface construction, if located on undeveloped lands, should be included in the final statement. The intense development of the area makes those few remaining relatively undisturbed areas highly valuable for fish and wildlife resources. Intensely developed park lands are not of much value to wildlife. Adverse effects on ecologically valuable areas should be discussed.

In sections 6.1.3 and 6.2.4, it is stated that the contractor is required to locate disposal points and dispose of settled solids and excavated material in an environmentally safe manner. The method of disposal will not be identified until the preconstruction meetings with the Metropolitan Sanitary District of Greater Chicago. We request the opportunity for the U. S. Fish and Wildlife Service to review and comment on proposed disposal sites at that time.

Archeological Resources

We are pleased to note that a review has been made of historic, architectural and archeological resources within the project area (p. xxxxi and III 15-17) and that no known cultural resources will be impacted by the project. We suggest that the statement identify the source for the conclusion in section 3.23 of the absence of archeological resources in the project area and also present evidence of consultation with the State Historic Preservation Officer, Mr. Anthony T. Dean, Director, Illinois Department of Conservation, 602 State Office Building, Springfield, Illinois 62706.

The final statement should describe how the recommendation (No. 8) for archeological investigations will be implemented and outline those procedures which will be followed to identify and protect any archeological resources encountered during project construction.

Geology and Ground-water Resources

The environmental statement is noteworthy for complete information on most subjects related to geologic and hydrologic conditions, including accurate cross sections, seismicity, faults, joints, folds, relationships between faults and seismicity, geological constraints, engineering geologic characteristics of rock formations, previous problems with excavation in shale in the Chicago area, stratigraphy, and ground-water resources.

It is stated on page IV-32 that "construction of the Mainstream Tunnel from 59th Street to Addison Street will account for approximately 3,027,000 cubic yards of spoil material." However, it is stated on page VI-26 that "excavation of the Phase I Mainstream Tunnel from 59th Street to Addison Street over the ten-year period from 1976 through 1985 will produce approximately 4,540,000 cubic yards (bulk volume) of spoil."

We read on page V-25 that "the best estimate of operation and maintenance costs at the time of publication of this report is an annual equivalent cost of $2.8 million." The tunnel segment covered by these costs is confirmed by the reference to "the estimate of $2.8 million for the 59th Street to Addison Street segment of the tunnel system." However, it is not clear what costs are referred to in the later reference on page IX-5 to "annual costs of operations and maintenance of the Tunnel Plan (estimated at $1 million for all three tunnel systems)."

An inspection program has been recommended as a means to detect stability problems, particularly in areas of the tunnel constructed partly in shale (for example, p. XI-1, #3). However, we found no details on the recommended inspection program in the draft environmental statement, such as the recommended frequency, required amount of time, type of observations required, and any seasonal constraints.

We note that the grouting program will be done "at maximum pressure to ensure that each grout hole is properly filled" (p. X-8). During the construction of the Roberts Tunnel in Colorado, it was reported (oral communication from personnel involved) that use of excess pressure could result in the complete grouting of water wells some 1500 feet above the tunnel bore. Possibly the actual grouting pressure program followed in the Chicago work will need some consideration of practical maximum limits based on the rock and ground-water situation in given reaches rather than the maxima allowed by the equipment used. We note that the text provides for drilling new water wells when the water in existing wells becomes clouded from the grouting (p. VI-11). However, if much complete grouting of wells--with the implied complete grouting of discrete openings in the aquifers--is contemplated, this would seem to imply the development of an extensive and massive grouted zone parallel to the axis of the tunnels. Such a zone could possibly constitute a significant negative boundary, the effects of which should be evaluated in the statement.

Sincerely yours,

Madonna F. McGrath

Madonna F. McGrath
Acting Special Assistant
to the Secretary

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

GREAT LAKES REGION
2300 EAST DEVON AVENUE
DES PLAINES, ILLINOIS 60018

APR 22 1976

EIS Preparation Section
Planning Branch
Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Sir:

We have reviewed the DEIS for the tunnel component of the Tunnel and Reservoir Plan (TARP). A more accurate determination of the effect of the TARP project on our facilities around O'Hare will not be possible until a more precise location of the project is known. Some preliminary findings are:

1. The DEIS does not have definite enough spoil disposal plans for the mainstream tunnel or full TARP project.

2. There is a possibility of interference to the operation of our McCook Air Route Surveillance Radar (ARSR) facility by the building up of a high spoil pile at the McCook Quarry.

3. We will need more detailed locations and alignment of the future lower Des Plaines system and the O'Hare system than is offered in this DEIS.

4. We have an outer marker for the O'Hare runway 32L Instrument Landing System in the Thatcher Woods Forest Preserve.

Sincerely,

KENNETH A. KRAUS
Environmental Officer, AGL-4.5

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
NORTHEASTERN AREA, STATE AND PRIVATE FORESTRY
6816 MARKET STREET, UPPER DARBY, PA. 19082
(215) 596-1671

8400
April 21, 1976

Mr. Francis T. Mayo
Regional Administrator
U.S. Environmental Protection Agency
Region V
230 South Dearborn St.
Chicago, Illinois 60604

Refer to: Draft Environmental
Statement, Tunnel Component,
Chicago Tunnel and Reservoir Plan

Dear Mr. Mayo:

Our Milwaukee Office has forwarded the above statement to us for review and comment as no National Forests are involved.

Our conception of the effects of the above project on forested land is uncertain because the tunnel spoil sites have not been selected. Using the material to fill quarries to street grade would have a positive net environmental impact if the filled area were graded and revegetated. On the sites we trust that the permit system will avoid destruction of vegetation and unsightly masses of spoil. We feel that a stockpile 600 feet in height should be avoided for aesthetic reasons and to limit erosion.

Thank you for the opportunity to review this Draft Statement.

Sincerely,

DALE O. VANDENBURG
Staff Director
Environmental Quality Evaluation

RECEIVED
APR 27 1976
OFFICE OF DIRECTOR
S&A Division, EPA, Region V

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

April 30, 1976

Mr. Francis T. Mayo
Regional Administrator
U. S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Mayo:

This is in reference to your draft environmental impact statement entitled "Mainstream Tunnel System, 59th Street to Addison Street." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving six copies of the final statement.

Sincerely,

Sidney R. Galler
Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosures Memo from: Mr. Robert R. Kifer

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Rockville, Md. 20852

APR 2 2 1976

Date :

Reply to Attn. of: CZ6

To : William Aron

APR 2 3 1976

From : Robert R. Kifer R.R. Kifer

Subject: DEIS 7603.15-TARP, Metropolitan Sanitary District of Greater Chicago

In review of the State of Illinois Coastal Zone Management Program development, it became apparent that a portion of the Chicago Lakefront Plan might be achieved by coordination of this program with the Lakefront Plan. The alternative of disposal of excavated material as fill for the Lakefront area, would seem to be worth-while. We suggest the alternative be further explored and discussed.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P.O. Box 678, Champaign, Illinois 61820

May 7, 1976

Mr. George R. Alexander, Jr.
Regional Administrator
U. S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Attention: Planning Branch - EIS Preparation Section

Dear Mr. Alexander:

The draft environmental impact statement forwarded to this office March 5, 1976 has been reviewed as requested.

We appreciate the attention given to our previous comments on a preliminary draft which included this area.

The Chicago Metropolitan Area River Basin Study, which the U. S. Department of Agriculture is providing planning assistance in, has been coordinated with the TARP Plan. In considering the Soil Conservation Service activities within the proposed area, we do not anticipate any conflicts and would expect both agency activities to complement each other.

Problems relating to erosion and sedimentation from the spoil material and construction activities has been recognized. According to the impact statement, control measures are to be required in the construction contracts.

Every opportunity should be explored to determine productive uses of the spoil material.

Research should be continued on the potential and proper use and application of digested sludge on agricultural and surface mined land.

We appreciate the opportunity to review and comment on this project.

Sincerely,

Daniel E. Holmes

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Daniel E. Holmes
State Conservationist

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
CHICAGO AREA OFFICE
1 NORTH DEARBORN STREET
CHICAGO, ILLINOIS 60602

REGION V
300 South Wacker Drive
Chicago, Illinois 60606

May 11, 1976

IN REPLY REFER TO:

Mr. Francis T. Mayo, Regional Administrator
U.S. Environmental Protection Agency
230 South Dearborn
Chicago, Illinois 60604

Dear Mr. Mayo:

Subject: Draft of Environmental Impact Statement for the Tunnel Component of the Tunnel and Reservoir Plan (Mainstream Tunnel System, 59th street to Addison)

In accordance with your request, we have reviewed the subject draft and concur in Phase I conveyance tunnel system and their associated subsystems to begin solving the flooding and water pollution problems of the Greater Chicago Area.

The early resolution of the flooding and water pollution problems will improve the livability and desirability of housing in the Phase I Area.

Sincerely,

John L. Waner
Director
Chicago Area Office

11.2.2 State

STATE OF ILLINOIS

DEPARTMENT OF CONSERVATION
605 STATE OFFICE BUILDING
400 SOUTH SPRING ST.
SPRINGFIELD 62706

ANTHONY T. DEAN
DIRECTOR

WILLIAM A. WATTS
ASSISTANT DIRECTOR

CHICAGO OFFICE—ROOM 100, 160 N. LA SALLE ST., 60601

April 23, 1976

Mr. Harlan D. Hirt
Chief, Planning Branch
U.S. EPA, Region V
230 South Dearborn St.
Chicago, IL 60604

Dear Mr. Hirt:

The Department of Conservation has reviewed your draft environmental impact statement for the Mainstream Tunnel System of the Metropolitan Sanitary District of Greater Chicago's Tunnel and Reservoir Plan which was transmitted to us on March 11, 1976.

This department supports the primary objective of TARP which is to improve surface water quality within the planning area.

Based on our review of your plan we have the following comments:

The spoil disposal sites are generally discussed and the statements in the plan lead one to believe that suitable, environmentally acceptable waste disposal sites will be utilized. We suggest these sites be fully discussed in the final EIS and that these sites avoid such areas as wetlands, timbered areas or areas with good wildlife habitat.

In general, we find the draft EIS acceptable in its description of environmental impacts associated with this project.

Sincerely,

Richard W. Lutz

Richard W. Lutz, Head
Impact Analysis Section
Division of Long Range Planning

RWL:mjk
cc: T. E. Hornbacker
State Clearinghouse

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STATE OF ILLINOIS

DEPARTMENT OF CONSERVATION
605 STATE OFFICE BUILDING
400 SOUTH SPRING ST.
SPRINGFIELD 62706

ANTHONY T. DEAN
DIRECTOR

[redacted]

CHICAGO OFFICE—ROOM 100, 160 N. LA SALLE ST., 60601

March 22, 1976

Mr. Francis T. Mayo
Regional Administrator
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Mayo:

My staff has completed review of the Draft Environmental Impact Statement for the Mainstream System of the Metropolitan Sanitary District of Greater Chicago's Tunnel and Reservoir Plan.

We feel that the section dealing with the effect of your project on the Historic, Architectural and Archeological Sites adequately takes into account the views of professionals in those fields.

This letter will serve as an acceptance by our office of the general draft statement as it pertains to the cultural environment. It does not constitute State Historic Preservation Officer "sign-off" for site specific projects covered by this statement.

Thank you for allowing us to comment.

Sincerely yours,

Anthony T. Dean
State Historic Preservation Officer
State of Illinois

ATD/lg

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Illinois
Richard H. Briceland, Director
Environmental Protection
2200 Churchill Road, Springfield, Illinois 62706 Agency

Telephone: 217/782-3397

April 26, 1976

Mr. George R. Alexander, Jr.
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, IL 60604

Subject: Draft Environmental Impact Statement - Mainstream Tunnel System, 59th Street to Addison Street

Dear Mr. Alexander:

The purpose of this letter is to set forth for the record the views of the Illinois Environmental Protection Agency with respect to the Mainstream Tunnel System as a component of the Tunnel and Reservoir Plan of the Metropolitan Sanitary District of Greater Chicago. We would also like to offer some general comments concerning the Draft Environmental Impact Statement prepared by USEPA prior to award of construction grants for key components of this system.

The Illinois Environmental Protection Agency wholeheartedly supports the construction of the Mainstream Tunnel System. Our consideration of the various aspects of the TARP proposal has, from the very beginning, concerned itself first with the environmental safety of the Plan, secondly with its projected effectiveness as a pollution control system, and thirdly with its feasibility of implementation. Underlying this consideration has been recognition that the waterways affected by combined sewer overflows from the Metropolitan Sanitary District will never reach a satisfactory level of water quality as long as these overflows continue unabated. Furthermore, we recognize that on many miles of these waterways these overflows represent the only significant point sources of pollutants, and that for these reaches little or no other clean-up action, public or private, will be required. We also know that the adverse impact of the substances discharged from these overflows extends far beyond the boundaries of the Metropolitan Sanitary District - at least to Dresden Lock and Dam on the Illinois River, and perhpas even beyond that.

We concur with the findings of the Draft EIS that the Tunnel and Reservoir System is environmentally sound. We believe that all significant adverse environmental impacts are either temporary in nature or can be dealt with by proper monitoring and mitigative actions.

We further believe that the TARP System represents the best alternative available for control of combined sewer overflows in the affected area. When the Plan is implemented, and with the provision of instream aeration facilities for which state construction funds have already or will be committed, attainment of water quality standards for most reaches of the Chicago-area waterways should be possible.

In our opinion, full implementation of Mainstream TARP is feasible, and indeed represents the only feasible combined sewer overflow control alternative for the Chicago area that we have examined. This feasibility is, however, contingent upon provision of federal funds for a large percentage of the capital cost of the project. The smaller the contribution of federal assistance, the longer full implementation will require and the less likely will be the eventual attainment of water quality standards for Chicago-area streams.

This Agency has reviewed the Draft Environmental Impact Statement for the Mainstream Tunnel System and is in substantive agreement with the principal conclusions and recommendations contained therein. We have identified a number of details where we believe amendments are in order, but they in no way affect the basic conclusions and recommendations that have been stated. Members of my staff have met with USEPA representatives to review these minor problems, and it was agreed that IEPA would submit a detailed list of specific changes which are recommended for incorporation into the Final EIS. This list will be submitted within the next few days.

We appreciate the cooperation extended to us in our review of this Draft EIS, and we thank you for your attention to our comments.

Cordially,

Richard H. Briceland

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ts

11.2.3 Regional

LAKE MICHIGAN FEDERATION
53 West Jackson Blvd. Chicago, Illinois 60604 (312) 427-5121

A Federation of Citizens in Wisconsin, Indiana, Illinois and Michigan

Richard L. Robbins
Executive Director

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Green Bay, Wisconsin

April 26, 1976

Harlan D. Hirt, Chief, Planning Branch
U.S. Environmental Protection Agency Region V
230 South Dearborn Street
Chicago, Illinois 60604

Re: Comments on Draft Environmental Impact Statement
for the Mainstream Tunnel Component of TARP

Dear Mr. Hirt:

The following comments are submitted with respect to the U.S. Environmental Protection Agency's (USEPA) Draft Environmental Impact Statement for the Tunnel Component of the Tunnel and Reservoir Plan (TARP) - Mainstream Tunnel System, 59th Street to Addison Street which is dated March, 1976 (the EIS).

1. The fill created by the excavation of the tunnel, as well as of the reservoirs, should be regulated by contract for acceptable disposal away from the construction site. The Conclusions and Recommendations section (p. XI-1) only indicates that the USEPA and MSDGC will "rely on existing . . . regulations to insure that disposal takes place in an acceptable manner." We do not believe this is an adequate safeguard. MSDGC has the primary responsibility for having created the fill in the first place and must assume its responsibility for the proper disposal of that fill. Sections 2.2.2 and 6.2.4 give no assurance that the fill created by this construction will not be used as landfill in Lake Michigan, and we believe such assurance should be given. Similar assurance should be given in regard to the sludge wastes referred to in section 6.2.3.

2. We do believe that USEPA has not adequately assessed (in sections 6.1.2, 8.1.2, 10.1.1) the likelihood of degradation and contamination of the upper aquifer as a result of the construction of TARP. It is made clear in section 3.3.1 that the funding of certain treatment plants is unlikely and that the financing for the planned reservoirs "is currently nonexistent; in addition, there is no reasonable expectation that any significant financing will be forthcoming in the near future." The lack of treatment facilities will materially affect the quality of water being held in the tunnel. The lack of reservoirs will affect the amount of water and the duration of holding such water in the tunnel. We believe the threat of contamination of the upper aquifer is much greater than acknowledged in the EIS.

23<

The waste and storm water will be stored in the tunnels instead of the reservoirs and therefore the pressure in the tunnels will be greater over a longer period of time than had been planned. As well, the wearing effect on the grouting and the unlined walls of the tunnel will be accelerated precipitously. The consequent exfiltration and degradation or contamination will be all but inevitable. The net effect is to build a system that will purportedly improve and stabilize the water quality of the area but that will actually have the effect of degrading the area's water quality.

3. The problem of decreasing piezometric, or hydraulic, pressure level of the upper aquifer due to infiltration is also critical. We see no reference to the fact that the suburbs of Chicago already have serious problems stemming from an inadequate water supply from the upper aquifer. A copy of the EIS should be submitted to the Water Resources Commission of the Illinois legislature for its comments. Because of the "heterogenous nature of the aquifer, it is virtually impossible to predict specific locations and quantities of leakage that may be encountered . . ." (p.VI-10). However the danger will be appreciably greater for adverse affects to the hydraulic pressure level of the upper aquifer if, as predicted, the reservoirs go unfunded and unbuilt.

4. Since the financing of the entire $3.54 billion MSDGC Flood and Pollution Control Plan over the next eleven years is doubtful and Congress has not yet approved any additional appropriation, we believe that the economic consequences of this lack of financing should be more thoroughly explored. In particular, the potential burden to be placed on taxpayers and users should be calculated on the assumption of the worst possible situation regarding the availability of federal funds. We do not believe that section 3.3.1 suffices for this purpose.

5. We believe that in light of P.L. 94-163 (The Federal Energy Policy and Conservation Act), the energy consumption potential of the construction of this tunnel project should be calculated. In particular, the vast amounts of energy required in the excavation and transportation of the "spoil" from the tunnel, should be calculated in section 6.4 as they were in section 8.4.

6. The impact of this project in diverting water from Lake Michigan is unclear. Of course, untreated waste water should be kept from overflowing into the lake, but the EIS should indicate whether the water, once treated, will be used in the recharge of the upper aquifer or used to replenish the lake. The EIS should also discuss the effect, if any, of TARP on the lake outfalls.

Very truly yours,

Thomas D. Eisele

Thomas D. Eisele
Deputy Director

TDE:bw

April 12, 1976

In reply
refer to:
(60.061)
(215.013A)

Mr. George R. Alexander, Jr.
Regional Administrator
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

SUBJECT: MSDGC Tunnel and Reservoir Plan (NIPC Project No. 76-A-023)

Dear Mr. Alexander:

The Northeastern Illinois Planning Commission has been involved in wastewater planning in the Chicagoland area for many years. A product of this involvement is our Regional Wastewater Plan.

During the last several years, we have reviewed many reports concerning the Metropolitan Sanitary District of Greater Chicago (MSDGC) Tunnel and Reservoir Plan (TARP). After extensive deliberations and discussions, our Commission revised the Regional Wastewater Plan on April 18, 1974 to incorporate the then current version of the TARP. We are in the process of doing this again and have a public hearing scheduled for April 14, 1976 to incorporate recent changes in the TARP in our Plan. These changes are based on prior review and endorsement by our Planning Committee of various components of the TARP under our responsibilities with respect to Circular OMB A-95.

This Commission hereby reaffirms its support of the TARP, of the Environmental Assessment and of the Environmental Impact Statement which have been prepared on the project as being consistent with comprehensive regional planning. The long term benefits will accrue to millions of people in northeastern Illinois who will benefit by the elimination of stormwater drainage hazards, and from the recreational, public health and aesthetic improvements that will be generated.

Sincerely,

Rockwell

Matthew L. Rockwell
Executive Director

MLR:lm
cc: MSDGC

JACK PAHL
President
CYRIL C. WAGNER
Vice President
DORIS B. HOLLEB
Secretary
WALDEMAR A. RAKOW
Treasurer

NORTHEASTERN ILLINOIS PLANNING COMMISSION
10 South Riverside Plaza, Chicago, Illinois 60606 (312) 454-0400

MATTHEW L. ROCKWELL
Executive Director

11.2.4 Local

CHICAGO URBAN TRANSPORTATION DISTRICT
123 WEST MADISON STREET **CHICAGO, ILLINOIS · 60602**

HAROLD E. NELSON
EXECUTIVE DIRECTOR
(312) 744-7440

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April 19, 1976
File: XD-3708

Mr. Harlan D. Hirt
Chief, Planning Branch
U.S.E.P.A., Region V
Room 204-A
Dirksen Federal Building
219 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Hirt:

The District has received the Draft Environmental Impact Statement for the Mainstream System of the Metropolitan Sanitary District of Greater Chicago's Tunnel and Reservoir Plan. In lieu of making an oral presentation at the April 12 hearing, we submit to you the attached comments. Should further question arise regarding the District's concern concerning the subject proposal, please feel free to contact Mr. William L. Barnes, Manager of Professional Services, at the District.

Very truly yours,

Harold E. Nelson
Executive Director

HEN:WTK:bmf

Attachment

ATTACHMENT

The construction of a number of drop shafts on the proposed Mainstream System may cause potential conflict with components of the Central Area Transit Project. The designated number* and location** of these shafts are listed below. Close consultation between the District and the MSDGC concerning the exact location, construction detail and scheduling of the above is deemed essential for the carrying out of both the Mainstream System and the Central Area Transit Project. The District should be kept fully informed as to the status of the subject project.

I. Core Plan/Monroe Line

#53, Jefferson and Monroe Streets

II. Core Plan/Franklin Line

#48, Roosevelt Road East
#50, Taylor Street
#52, 300 block of W. Quincy Street
#54, NE corner of Wacker and Franklin Streets
#61, West Kinzie Street between Kingsbury Street and Chicago River, North branch

III. Balance of System/Lake Front North

#55, North side of Wacker 100 feet East of Michigan Avenue bridge
#60, North Water Street East of St. Clair Street

IV. General

The subway also crosses the proposed tunnel at the Main Branch. Although the vertical alignment between the two is deemed great enough so that there will not be functional interference between the two, lack of coordination may cause on-site disruptions common to both during the construction period.

*See Table V-2 of EIS Draft
**See Figure V-5 of same

NIC LAS J. MELAS
ESIDENT

THE
METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
100 EAST ERIE ST., CHICAGO, ILLINOIS 60611 751-5600

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April 28, 1976

Mr. Harold E. Nelson
Executive Director
Chicago Urban Transportation District
123 West Madison Street
Chicago, Illinois 60602

Subject: Tunnel and Reservoir Plan

Dear Mr. Nelson:

We have received a copy of your letter of April 19, 1976 to the USEPA. Your letter expresses concern over the location of our Drop Shafts and the proposed Rapid Transit Project.

Transmitted are the proposed Contract Plan Sheets for the listed shafts. In laying out these structures our Consultants (including DeLeuw-Cather who is also your Consultant) have had your available preliminary plans.

A copy of this letter is being forwarded to the USEPA for inclusion in the record.

Very truly yours,

F.C. Neil

FORREST C. NEIL
Chief Engineer

FCN:pl
Attachment

cc: Harlan D. Hirt
USEPA

CITIZENS FOR A BETTER ENVIRONMENT
59 East Van Buren, Suite 2610 Chicago, Illinois 60605
Business Office: (312) 939-1984 Research Office: (312) 939-1530
Elgin Office: 317 East Chicago Ave., Elgin, Illinois 60120 (312) 697-3783

April 26, 1976

Mr. Harland Hirt:
Planning Branch
U.S. EPA
230 S. Dearborn
Chicago, Illinois 60604

Dear Mr. Hirt:

Enclosed please find my statement which I would like to have admitted to the record of your public hearing of April 12 on TARP.

Thank you.

Yours truly,

Marvin B Jones

Marvin B. Jones
Land Use Planning

100% recycled paper: contains only fibers reclaimed and deinked from waste paper

While the purpose of Section 201 is to improve water quality, construction grants awarded under this section can have enormous implications for land development, since in large measure the size and location of sewage treatment facilities, along with the size and placement of connecting interceptor sewer lines, determined the extent and shape of community growth. At a hearing conducted last Fall by the U.S. Army Corps of Engineers, I think I heard a projected Chicago population figure of 8 million being mentioned in conjunction with the underflow proposal. This 8 million figure may not be correct, but I do recall a significant population increase was anticipated.

Past evidence has indicated that where sewer facilities are built for a population considerably larger than existing in an area, growth to the capacity of the system is generated. Thus, great care should be taken before new sewage facilities are constructed to assess their land use impacts, to consider alternative dimensions and to provide for needed land use planning and regulation.

Unfortunately, it appears that very little attention has been paid to the land use implications of Section 201 grants. A study published by the Council on Environmental Quality analyzed 52 EPA grants for sewage construction, showed that the grants had provided for substantial excess sewage capacity, and that either the land use impacts of the grants had not been assessed or negative secondary effects of residential developments had not been considered. In fact, according to the CEQ study, procedures used in the physical design of interceptors, local planning and review procedures for project plans, and methods of project financing may encourage the "inevitability" of development.

Study findings indicate that current financial procedures - on both the local and federal level - may encourage the construction of sewage systems tailored to the needs of future developers rather than the control of pollution problems. Since the federal program is viewed as a one-time only opportunity, communities are encouraged to seek as much excess capacity as possible.

The projected growth figures (8 million or whatever) means that Chicago is not only trying to improve water quality, but is also trying to obtain a federal subsidy for growth - growth on vacant lands. This appears to run counter to the intent of the act which requires the EPA administrator to encourage sewage schemes which combine open space and recreational consideration with waste management.

The 1972 amendments to the Federal Water Pollution Control Act provide some safeguards for the construction grant program to assure that it is focused on improving water quality, and that the land use effects of the program are assessed adequately. Are these safeguards incorporated into this proposal? Let me be more specific:

1. Before a treatment plant or sewage system is constructed, federal funding is available for the development of a facilities plan that assesses the effects of the proposed construction. Has this plan been developed? If this plan is carried out, there must be an emphasis on land use impact.

2. The act requires integration of Section 201 grants with the planning provision of Section 208 and 303. The Section 208 provision reflects Congress' intent that the construction of waste treatment facilities be coordinated with the land use planning and regulation required under 208. Grants for sewage construction must also be in conformity with state planning under Section 303 through which statewide construction priorities must be established.

In the past, EPA's desire to expedite the granting of funds available for waste treatment facilities has led EPA to overlook important land use consideration.

In conclusion, Section 201 is extremely important in terms of land use. Citizens For A Better Environment is aware of its potential impact on this city and hereby questions a basic assumption of this plan - that growth is good and we want to be a city of 8 million people.

At that hearing, I also mentioned that Citizens For A Better Environment is concerned over the airborne viruses that escape from sewage treatment plants, and as a result we are opposed to these treatment plants being constructed adjacent to residential areas. I documented this concern with a number of scientific research experiments conducted in the past ten years and challenged the conclusion in the Underflow Report which dismissed the danger of airborne viruses. I will not repeat that statement but I would respectfully request that it be incorporated into these hearings. Thank you.

City of Chicago
Richard J. Daley, mayor

Department of Public Works
Bureau of Engineering

320 North Clark Street
Room 700
ago, Illinois 60610
744-3544

Marshall Suloway
Commissioner

Louis Koncza
Chief Engineer

APR 22 1976

Mr. Harland D. Hirt
Chief, Planning Branch
USEPA, Region V
230 South Dearborn Street
Chicago, Illinois 60604

Re: USEPA - Draft Environmental Impact Statement
TARP (Mainstream Tunnel System)

Dear Mr. Hirt:

The City of Chicago strongly endorses the findings of the Environmental Assessment Statement for the Mainstream Tunnel and Reservoir Plan (TARP). We urge the USEPA to make funding available at the very earliest date for this project; which is a comprehensive plan and when it is completed it will benefit Chicago and the suburbs along the North Branch of the Chicago River and the Sanitary and Ship Canal.

The City of Chicago has cooperated with the Metropolitan Sanitary District of Greater Chicago, the County of Cook and the State of Illinois in developing the Tunnel and Reservoir Plan as a practical and economical solution to the drainage, pollution and flooding problems of the Chicagoland and surrounding Community areas.

We believe that this proposed project is necessary and of vital importance.

Very truly yours,

Marshall Suloway
Commissioner

Originated by:

Louis Koncza

Louis Koncza
Chief Engineer

THE CITY OF DES PLAINES
COOK COUNTY, ILLINOIS
MEMBER ILLINOIS
MUNICIPAL LEAGUE

RICHARD F. WARD
Alderman 8th Ward
1410 Miami Lane
Des Plaines, Illinois 60018
(AC 312) 827-8715

April 26, 1976

Comments on March, 1976 Draft EIS on Addison to 59th MSD's TARP Plan that includes discussion of overall TARP Plan.

Specific and complete response to each segment of every question and comment is requested in accordance with 40 CFR 6.24(a) and 6.32(g). Past experience dictates that I caution the readers of the final EIS to examine each USEPA response for completeness in addressing the question asked. Recent Region V response in EIS's has simply avoided answering difficult questions to expedite project approval prior to a fiscal year funding deadline. The following paragraphs are in no particular order and are numbered for ease of response by USEPA.

1. TARP "POSSIBLE INTERCONNECTION"

As of this writing it seems reasonably certain that many of the highest MSD officials will be indicted by the Federal Grand Jury for arranging and accepting nearly $3 million in payoffs in connection with the barge sludge hauling scheme. In analyzing the TARP options available, we must continually remember that we may not be dealing with honest men. But the $3 million in bribes is insignificant when compared to $65 million to $150 million that will be overspent on the selected TARP options in the March, 1976 draft EIS under consideration.

As page IV of the draft EIS indicates, the "cumulative effects" of 3 out of 4 of the TARP subsystems are being addressed. And there are several references to the total TARP system such as the table of alternatives considered by the FCCC on page IV-17. The original 1972 TARP was a "composite of alternatives G, H, J, and S" (page IV-10). Let's take a closer look at these 4 alternatives and the 1972 Capital Costs associated with the selected MOD 3 level of retention (page IV-17):

	1972 Capital Costs	Reservoirs
G	$1,002,000,000	McCook
S	979,000,000	McCook, O'Hare
J	921,000,000	McCook, Calumet, Stearns
H	912,000,000	McCook, Calumet

The 1972 TARP that was a composite of these 4 options included a "possible interconnection" between the O'Hare

Tunnels and the Lower Des Plaines Tunnels (which is one of the 3 TARP subsystems under review in the March, 1976 draft EIS). To quote from the inadequate USEPA statement on page 3-7 of the May, 1975 final EIS on the O'Hare TARP subsystem, "In evaluating the four alternatives recommended by the FCCC, the MSDGC compared alternative G which included an interconnection of the O'Hare tunnels with the lower Des Plaines tunnels and McCook reservoir, against alternative S that excluded the interconnection, but provided a separate reservoir in the O'Hare Service Area. As indicated in the above table, the costs of the interconnection resulted in net increase of approximately $32 million in capital costs above the 2 storage concept. As such, it was concluded that the interconnection should not be made." My 13 year old son questioned the logic of that statement and asked, "Why didn't they also compare S with J and H? And was the comparison made with and without the O'Hare plant (70 MGD capacity $124,000,000)?"

Question: Is it more economical, considering both capital and operating costs, to eliminate the proposed O'Hare plant, connect the O'Hare tunnel to the lower Des Plaines tunnel, utilize the flow equalization capability of the McCook reservoir and the planned excessive expansion of Stickney? The sadness of asking this question in 1976 is that it has been asked several times before in many different forms since 1966 but no cost comparison has ever been revealed to the public. Why? At this point I really hope that the cost analysis has never existed. It would be worse to find that crooked MSD officials nave cleverly hidden the analysis and our timid environmental agencies have not had the courage to insist on the analysis because they may be criticized for any possible interruption or delay in the flow of money. In the meantime the taxpayers pay to maintain bureaucracies that overspend on non-cost effective projects. And our good President seems powerless to slow the deficit spending.

If the MSD and USEPA think they are right, then they should obey the law, follow their regulations, produce the cost comparison and thereby silence this critic on this very important basic point. If the "updated" cost analysis indicates the best options have not been proposed, then revise the facility plan and proceed with the necessary review steps. But to proceed to implement a MSD facility plan that was formulated without the required cost effective analysis is an arrogant abuse of the public trust by the MSD and the USEPA.

And the $3 million in bribes should not divert our focus on the entire $6 BILLION MSD plan. If it is proven that the MSD officials were able to "earn" $3 million in kickbacks from the $43 million barge contract, at that rate of payoff, it is hard to imagine splitting up $419 million in bribes on the $6 billion MSD/USEPA/COE plan. Ridiculous. But we obviously must watch the MSD more closely than we have up to today.

In regard to the above "question" we expect the following type of side-by-side COST comparison on the TARP "possible interconnection" between Upper (O'Hare) and Lower Des Plaines TARP tunnels:

CONNECTION ALTERNATIVE

1. Increase size of Lower Des Plaines tunnel to handle O'Hare tunnel flow.
2. Cost of connection tunnel.
3. Cost of 40 MGD expansion of Stickney if necessary. (1½ ADWF no longer needed with flow equalization of reservoir).
4. Present worth of additional cost of operating additional capacity at Stickney. (Not "share" of cost but only "additional" cost).
5. Present worth of additional cost for sludge to Fulton (minus bribe factor).
6. Increase size of McCook reservoir by 2700 acre feet (if needed).

SEPARATE ALTERNATIVE

1. Resale value of O'Hare reservoir land.
2. Construction cost of O'Hare reservoir.
3. Present worth cost of operating O'Hare reservoir.
4. Resale value of O'Hare plant land.
5. Construction cost of O'Hare plant.
6. Present worth of future operating costs of O'Hare plant.
7. Present worth of sludge cost to Fulton via Egan and truck (minus bribe factor).
8. Sludge line to Egan.
9. Additional Willow-Higgins Creek improvements due to planned O'Hare plant effluent.
10. Cost for aerosol suppression facilities for O'Hare plant.
11. Cost for aerosol suppression facilities for O'Hare reservoir.
12. Cost of continued litigation.

2. NORTHSIDE PLANT EXPANSION

The March, 1976 draft EIS on TARP refers to the expansion of the Northside plant on page xxviii: "The financing feasibility of the Northside and Calumet treatment plant expansions, however is reasonable in view of their combined total estimated costs of $505.1 million." On page xxv of the draft EIS we are advised, "the Calumet and Northside treatment facilities expansion project (which represent the next major projects in terms of priority of Federal funds)....." The draft EIS states on page III-31, "In terms of priorities, the treatment plant expansions at Calumet (estimated cost of $352.8 million) and North-Side (estimated cost of $152.3 million) stand directly behind instream aeration."

On page V-9 of the draft EIS, it states, "The Northside plant will have a capacity of 436 MGD and will process wastewater from the northern half of the Mainstream system." I will now drag some more MSD dishenesty (or "lack of objectivity") into the public view. Slide #16 on page 6-32 of the May, 1975 final EIS on the O'Hare plant segment of TARP indicated that the year 2000 40 MGD flow from the O'Hare "Service Area" could be handled by the planned expansion of Northside to 436 MGD. USEPA "handled" this recommendation received in public comment by simply stating on page 6-45: "It should be pointed out that a preliminary agreement has been reached between MSDGC, IEPA and USEPA not to proceed with expansion plans for the Northside sewage treatment facility." This is a very effective clever way of handling public comment. Now after the $124 million O'Hare plant is out for bids again, all parties can merely say, "Oh, yes, we changed our minds". Isn't that convenient -- and dishonest! The public now requests a complete explanation why the "Northside Service Area proposal dated 2/19/75" is not the most cost effective solution. And hiding behind the legal skirts of pending litigation is no explanation -- if administrative actions are proceeding forward to spend our money without the cost analysis being available to the public for review.

3. NECESSARY TREATMENT CAPACITY

In the description of the MSD area on page v of the March, 1976 draft EIS, it indicates that the existing treatment capacity is 1850 MGD. Page v-3 of the draft EIS reveals that the planned capacity of the 3 main plants, Northside, West-Southwest and Calumet is 2150 MGD.

Do we need increased processing capacity or just retention? Page E-45 of the 10/75 draft Urban Water Damage Study reveals that the population will only increase 10.2% from 5,369,000 in 1970 to 5,917,000 in 2000. But the processing capacity will be increased 55% from 1459 MGD in 1970 to 2265 MGD in 1990. This discrepancy is not explained with either increased water usage or increased capture of storm runoff.

The total current flow treated by the MSD is 1409 MGD (page 15 of the November 1973 draft EIS on TARP). This includes the dry weather flows conveyed to the treatment plants of 1200 MGD (66 inches/year equivalent average depth) plus the runoff from small storms conveyed to the treatment plants by the present interceptors of 109 MGD (6 inch/year equivalent). If we add to this 1309 MGD the runoff from large storms that could be captured by a tunnel system of 218 MGD (12 inch/year equivalent) and a factor for growth of 150 MGD, then the total that will need to be processed is only

1677 MGD. Considering the flow equalization capabilities of the larger constant diameter retention tunnels discussed in paragraph 4, we will not need a processing capacity of 2265 MGD in 1990! It would be sincerely appreciated if either the MSD or State or Federal authorities would please address this set of facts. The USEPA and the COE have a responsibility to the taxpayers of this Nation that is not being fulfilled. Please explain how the total planned processing capacity will be needed in relation to the flow equalization capabilities of the planned reservoirs.

4. AN AFFORDABLE ALTERNATIVE

The key words that are achievable are FIRST-FLUSH RETENTION. The $6.4 billion total MSD/USEPA/COE program is an excessive expense that cannot be offset by demonstratable benefits. (See discussion of flood damage survey and precautions taken by citizens in previous oral testimony at COE hearing on November 12, 1975). In the absence of significant current flood damage losses to our citizens, and a recognition of 95% to 98% BOD and SS reduction with first-flush capture, it can only be concluded that what is needed at a reasonably modest cost is first-flush retention. This would be achievable by near constant diameter retention tunnels with computer controlled adjustable gate baffles. After the first flush was captured in the 1 - 2 mile long tunnel compartments and after the storm subsided, the tunnels could be emptied by a system of strategically located pumps to the near surface interceptors and also by gravity by opening the "gates" in computer controlled succession to effect a tunnel flushing action. The tunnel diameters and compartment lengths would be determined by the predicted 100 year storm flow to that compartment that would capture the desired percent of BOD and SS. With a storm of uneven distribution, the available retention remaining in adjoining tunnel compartments would be fed to a computer to partially open the gates of adjoining compartments to use a programmed portion of the adjoining capacity while still leaving sufficient storage for the first-flush pollutants in that "tunnel segment collection area". Further discussion of this modest cost achievable option is encouraged by calling this reviewer at AC 312, 827-8715.

The people of this Nation deserve value for their tax dollars and I pledge my efforts to this goal.

Respectfully submitted,

Richard F. Ward

Richard F. Ward
Alderman

CITY OF EVANSTON

EVANSTON, ILLINOIS
60204

COUNCIL-MANAGER
GOVERNMENT

MUNICIPAL BUILDING
1501 OAK AVENUE
GReenleaf 5-3100

April 20, 1976

Mr. Harland D. Hirt,
Chief, Planning Branch
U.S.E.P.A. Region V
230 South Dearborn Street
Chicago, Illinois 60604

RE: Draft ENVIRONMENTAL IMPACT STATEMENT
TARP (Mainstream Tunnel System)

Dear Mr. Hirt:

This is to comment on the draft Environmental Impact Statement prepared by the U.S.E.P.A. on the Mainstream Tunnel System. As you can appreciate, communities like the City of Evanston, do not have the expertise to comment on the technical aspects of the proposal. The findings regarding such questions as the affect of earthquakes, shale deterioriation, tunnel stability, and construction procedures, etc., are beyond our inhouse capabilities and in these areas, we accept the statements made by the professionals.

Of particular significance,to our community, is the fact that the statement fully recognizes the objectives of the tunnel and reservoir plan, and sets forth these objectives as follows:

1. *To prevent backflows into Lake Michigan and thereby protecting our water supply resources.*
2. *Reduce pollutant discharges caused by combined sewer overflows.*
3. *Most importantly, to our community is the reduction of flooding and polluting in the combined sewer downstream areas.*

The Evanston City Council and the Flood and Pollution Control Commission are aware of certain inconveniences which will be caused by the tunnel construction in our area. We are aware that there will be construction traffic and general inconveniences over the construction period. However, the City Council and the Flood and Pollution Control Commission are also cognizant of the damage, inconvenience, pollution of the environment and the potential health hazards caused by the backup and flooding of our sewer system. Further, we have great concern about the quality of water passing into and through the North Shore Channel which is opened to our Lake Michigan water supply during certain rain storms.

We believe that the quality of water in the North Shore Channel can be improved, and the flooding of properties and pollution of our water resources can be reduced by the construction of the Tunnel and Reservoir project proposed by the Metropolitan Sanitary District of Greater Chicago.

In tandum with the proposed Tunnel and Reservoir project the City of Evanston commissioned an extensive study to determine the adequacy of the local sewer systems and the most practical methods of rehabilitating the facilities and implementing improvements. The charge to the Consulting Engineers making the study included developing systems that would be compatible and take direct advantage of the relief which can be obtained by utilization of the proposed deep tunnel facilities.

Our study is now completed and steps are being taken to obtain funding to develop detailed plans and specifications for construction of the recommended improvements.

The Tunnel and Reservoir project of the Metropolitan Sanitary District of Greater Chicago is endorsed by the City of Evanston and we recommend and urge that further funding for this project be approved.

Thank you for the opportunity to comment on the draft Environment Impact Statement.

Very truly yours,

RGatti

Richard A. Gatti,
Deputy City Manager

RAG/amj

N OLAS J. MELAS
PRESIDENT

METROPOLITAN SANITARY DISTRICT
OF GREATER CHICAGO
100 EAST ERIE ST. CHICAGO, ILLINOIS 60611 751-5600

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April 26, 1976

Mr. Harlan D. Hirt
Chief, Planning Branch
United States Environmental
Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Subject: Mainstream Tunnel System
Draft Environmental Impact Statement

Dear Mr. Hirt:

As stated in the presentation by President Melas at the Environmental Impact Hearing, the District is providing additional comments on the Impact Report.

COMMENTS ON THE CONCLUSIONS AND RECOMMENDATIONS
Pages XXXX and XXXXI

Conclusion Number 2

The earthquake history of the area has been considered in the design of the tunnel alignment and lining. Earthquakes of a magnitude which could adversely effect the tunnels are not aniticipated. A repeat of any of the historical earthquakes would have no adverse effects on the tunnels.

Conclusion Number 3

Rock stabilization and concrete lining programs will result in the stabilization in the shale formations and no shale deteriorations are anticipated.

Conclusion Number 5

The grouting program is sufficiently flexible to respond to actual conditions encountered. As stated in the report an infiltration rate less than that of a conventional sewer will be achieved. The District's observation wells have been in place for several years and no lowering of the groundwater level has been observed. In addition, there are no wells existing in the area to cause a lowering of the water table. Therefore, the naturally tight rock formations plus the cement grouting program and the naturally groundwater levels provide assurance that no adverse effects will occur.

Conclusion Number 7

Since access to MSDGC interceptors is not always available, the contractor will be required to treat the water pumped from the tunnels to meet EPA standards.

Conclusion Number 8

The State Historic Preservation Officer has been contacted in the past and will continue to be contacted concerning archaeological resources.

Conclusion Number 10

No conflict exists between the transit project and the proposed dropshafts. The District's consulting engineer has chosen locations to assure no conflict with the current transit plans.

COMMENTS ON THE EXECUTIVE SUMMARY

Page 4, Section 1.2, Second paragraph:

Change the phrase "other components of TARP" to read "other MSDGC projects."

Page 5, First paragraph:

Delete MSDGC owned in the first sentence.

Page 7, Sentence 1.5:

Revise the section to add that the objectives of TARP are:

1. Elimination of waterway pollution caused by combined-sewer overflows.

2. Provide for flood control in the combined-sewer and downstream areas.

3. Prevent backflows to Lake Michigan.

Page 10, Second paragraph, Fourth sentence:

Change "The industrial waste load averages of approximately 195 mgd" to "The industrial waste load to the MSDGC plants is equivalent to the loading from a population of 4½ million people."

Page 14, Section 2.2.4, First paragraph:

Change 8.1 billion dollars for flood control measures to 1.15 million dollars for flood control measures as per the MSDGC Facility Plan Report.

Change the operation and maintenance cost of all of TARP from 1 million dollars annually to 13.6 million dollars annually as per the August, 1972 Summary of Technical Reports.

Change the Mainstream annual maintenance cost from $472,000.00 to $2,300,000.00.

Page 19, Section 3.3, Second paragraph:

Change the total storage capacity of the plan from 115,000 ac-ft to 136,000 ac-ft.

Change 105,800 ac-ft to 127,600 ac-ft for the reservoir capacity.

Change the next to the last sentence to read the total District planned treatment capacity will be approximately 2,240 mgd.

Note: Each of the above numbers are from January, 1975 Facility Plan Report.

Page 22, Section 3.5:

Change 64,000 ac-ft to 84,000 ac-ft.

Change 2 pumping stations to 1 pumping station.

In the second paragraph, the first sentence should read Phase I construction has already commenced on the North Shore channel segment from Addison Street to Wilmette Harbor.

Page 22, Section 3.6:

Remove the second paragraph as all the tunnels will be circular and constructed by mechanical boring machines and no large rectangular tunnels will be constructed.

Page 24, Under Dropshafts:

Remove the last phrase, "and by eliminating concrete lining."

Page 27, Under Footnote 12:

Change table III-10 to III-1.

Page 31, Twelfth line:

Change 75% to 90%.

Eighteenth line, change uncontrolled injections to uncontrolled combined-sewer overflows.

COMMENTS ON THE ENVIRONMENTAL IMPACT STATEMENT

Chapter 5, Page 4, Section 5.1.2, Number (2), First paragraph, Last sentence:

Remove "are to be pumped out."

Chapter 5, Page 23, Section 5.3.1:

Remove the second paragraph since the tunnel dewatering rate is not related to the rate of runoff during the storm.

Chapter 10, Page 2, Section 10.1, Number (2), Third sentence:

Change to read "These rates, if not reduced, may be sufficient to reduce the upper acquifer pressure to a critically low level."

Chapter 10, Page 7, Section 10.1.4, Number (2):

Omit the first four paragraphs since no monitoring wells to sample water quality along the mainstream tunnels as described have been proposed. Substitute "Groundwater level observation wells along the route of the mainstream tunnels have been installed for several years. Groundwater levels have been recorded, are high, and no lowering of these levels has been observed. Since this groundwater level is recharged locally by the 33 inches of annual rainfall and no wells exists that are lowering the water table, continued observation of the high groundwater levels, the grouting program, and the naturally tight rock formations will assure that no deterioration of groundwater quality is occurring."

With respect to the fourth paragraph, the water pressure maintained in the water supply pipeline system is considerably greater than the surrounding groundwater level. Therefore, no increase in pipeline pressures will be necessary during or after the storms.

Very truly yours,

F. C. Neil

Forrest C. Neil
Chief Engineer

FCN:pl

DEPARTMENT OF
STREETS AND SANITATION
BUREAU OF SANITATION
ROOM 704 - CITY HALL
CHICAGO, ILLINOIS 60602

RICHARD J. DALEY
MAYOR

FRANCIS J. DEGNAN
ACTING COMMISSIONER

LOUIS P. FARINA
DEPUTY COMMISSIONER

JAMES CALLAHAN
GENERAL SUPERINTENDENT

April 6, 1976

United States Environmental Protection
Agency - Region V
230 South Dearborn Street
Chicago, Illinois 60604

Attention: Planning Branch - EIS Preparation Section

Subject: Draft Environmental Impact Statement for the Tunnel Component of the Tunnel and Reservoir Plan (TARP) Proposed by the Metropolitan Sanitary District of Greater Chicago - Mainstream Tunnel System, 59th Street to Addison Street

Gentlemen:

Our review of subject report notes that Stearns Quarry is frequently referred to as inactive and also that this quarry is proposed as a fill site for the disposal of rock excavated from subject project. Please be advised that these references are not correct.

The City of Chicago owns Stearns Quarry and it is in active use. The Bureau of Sanitation of the Department of Streets and Sanitation uses this site for the disposal of incinerator ash and proposes to continue with this operation for some time into the future.

Thank you for this review opportunity and we hope our comments will be an aide to the overall planning of this project.

Very truly yours,

Francis J. Degnan

Francis J. Degnan
Acting Commissioner

Originated by:

Louis P. Farina
Deputy Commissioner

LPF:EN:ab

445 FORM S & S. 3

April 19, 1976

Harlan Hirt
Chief, Planning Branch
U.S. EPA
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Hirt:

After reviewing the Draft EIS for the Tunnel Component and Reservoir Plan (TARP), I wish to make the following comments:

1) Page X-7, Section 2, Ground Water. Recently radioactive materials were found in wells at the Palos Forest Preserve on the city's southwest side. Apparently these toxic substances had seeped into the water table from a waste deposit from the Manhattan Project during World War II. While no radioactive materials are used in TARP, what protection does the ground water have in long term transportation of pollutants that will be in contact with the ground water table? Are we to expect pollution of wells 30 years from now because we did not consider the long term effects? I hope not.

2) Page X-9, Section 4, Air Quality. This section begins with a discussion of air pollutant emissions from construction vehicles, etc. I suggest that every construction vehicle involved with TARP, including your agency, be tested by the Chicago Department of Environmental Control's vehicle emission testing program. If a vehicle does not pass the emission test, it would not be allowed to participate at any of the construction sites. Since this vehicle emissions test is free, and if your efforts are sincere, I strongly urge that this emissions test be mandatory for the TARP construction as well as any future construction projects. This should be a regular format for all Environmental Impact Statements, that all vehicles take and pass the Chicago Department of Environmental Control's vehicle emission test.

I appreciate your time and consideration for the above mentioned comments.

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Sincerely,

Joseph E. Marks

Joseph E. Marks
12512 South Harold
Palos Heights, Illinois
60463

THE MORTON ARBORETUM LISLE, ILLINOIS 60532 Phone: 312/968-0074

Founded by Joy Morton, 1922

April 12, 1976

Harlan D. Hirt, Chief
Planning Branch
U.S.E.P.A.
230 South Dearborn Street
Chicago, Illinois 60604

Dear Mr. Hirt:

I attach a statement I have made on the proposed Chicago Tunnel and Reservoir Plan which I would like to have included in the record of the public hearing to be held April 12 on The Draft Environmental Impact Statement prepared by the U.S. Environmental Protection Agency, Region V.

While my study was not specifically in response to the Subject Draft Statement, I feel it is quite à propos and worthy of consideration in a plan of such dimensions. So far as I can see many of the questions I raised in my remarks to the Corps of Engineers have not been answered and the suggestions I have made have apparently not been given consideration.

I feel especially strongly about this in view of the fact that The Testimony given at The Corps of Engineers Hearing has never been published.

There was a register at the Hearing which indicated that a copy of the proceedings would be provided anyone signing it, but in fact no copies have been provided and no communication received explaining this failure. I understand that it is possible to go in and have desired pages copied, but this seems like a ridiculous economy when we are talking about an expenditure of billions.

Very sincerely,

Alfred Etter
Naturalist

AE:ag
Enclosure
Copy to Russell E. Train, Administrator, EPA, Washington DC

Statement prepared to elaborate on testimony presented by Dr. Alfred Etter at Public Hearings held by the U.S. Army Corps of Engineers at Thorn Hall, Northwestern University November 12, 1975, concerning the planned Chicago Sanitary District Underflow Project.

I am Dr. Alfred Etter. I reside in Du Page County where I serve as Naturalist at the Morton Arboretum, Lisle, Illinois. My testimony in no way represents the views of that or any other institution, nor is my interest in these hearings the result of residence or pecuniary involvement in any area which might be affected by the proposed project. Instead, I speak from a lifelong interest in how we use, and misuse, the earth. I feel that this project should be examined from every point of view, and especially with regard to how compatible the planning may be with natural processes, and with what might be called a minimum maintenance philosophy.

Credentials and Reasons for Concern

My credentials include an A.B. in geology, graduate study in wildlife ecology and land use at the University of Wisconsin, and a Ph.D. in ecological botany at Washington University. I have served as either lecturer or researchist with Washington University, Michigan State University, President Truman's 1950 Water Resources Policy Commission, the National Audubon Society, Defenders of Wildlife, and O.M. Scott and Sons Lawn Products Co. During World War II I served 5 years as a Laboratory Officer in aerial photography and map and model-making squadrons of the Air Force.

I have not made the Underflow Project a subject of detailed or prolonged research, but have been looking at some problems in the Des Plaines River watershed as they impinge on the town of Riverside. This area was recently distinguished as a "National Historic Landmark" because of the significance and success of Frederick Law Olmsted's pioneering efforts to integrate and preserve both man and nature in this suburb of Chicago. The Chicago Underflow Project cannot help but affect the future fate of this attractive community.

Short History of Chicago's Water Problems.

Chicago has always had a water problem. Even before the city was built nature had trouble draining the area, and often vacillated whether to send the waters to the Atlantic or the Gulf. Depending upon the height of glacier ice and melt water in the Great Lakes, the flow was sometimes to the Mississippi and sometimes to the St. Lawrence. Even in those days, wastes and water were intimately commingled -- but then the landscape consisted of prairies, marshes, swamps and lagoons. Native vegetation and natural process combined to cleanse and redistribute wastes through the whole biota so that effluents from the cattails and cordgrass had just the right fertility level to make Lake Michigan rich in trout and sturgeon, and the Illinois River productive of catfish, ducks, and mussels.

Soon after a group of white men established a permanent village at Fort Dearborn in 1816, this ancient balance began to be disrupted as human wastes were deposited in shallow pits where in time they mixed with both surface and underground waters. The comparatively modern human practice of attempting to hide wastes by mixing them with water is almost unique among land mammals, most of which rely upon aerial degradation of both feces and urine. This "aquatic" habit, and plumbing to accommodate it, are at the root of civilization's perplexing waste problems. Inadequate attention has been given to the development of non-aqueous aerobic systems of waste treatment, but that is beyond the scope of this testimony.

By the late 1850's the mixture of mud, water and wastes had become intolerable for such an ambitious metropolis, and so, by its own bootstraps so to speak, the town lifted itself some 10 feet out of the mire and began to install sewers. This action only served to move the problem to the Chicago River and Lake Michigan and soon once again water supplies were threatened and the atmosphere beyond description. By 1865 Chicago according to the City Commission itself had gained "world wide fame for its vile odors". (Report of City Commission to the Mayor and Common Council, March 6, 1865. In Brown, G. P., Drainage Channel and Waterway, Chicago, 1894. p. 79.) The answer was to attempt to dilute the rivers with lake water while pumping the effluent into the Illinois River via a slightly deepened Illinois and Michigan Canal. This was accomplished by 1871 but only moved the problem a little further away. By 1877 the water in the Canal at Joliet, 36 miles distant, was described as being "filthy" on 249 days of a 14 month period, while the odor of the surrounding air was "marked" on 117 days, and fish were unable to live in the canal water. (Brown, G. P., Drainage Channel and Waterway, Chicago 1894, p. 309.)

Next came an effort to install bigger pumps and feed more lake water through the canal system, but by 1891 it was said that "With little more than half the required amount of water pumped from the river, and the sewage discharged into the river greatly increased because of the rapid growth of the city, the river and the canal again became very foul and offensive." (ibid., p. 318).

Agitation finally culminated in a wholly new and larger lake-level channel, the Chicago Sanitary Drainage Canal, being cut through the ancient divide that separated the Mississippi and Great Lakes. This went into operation in 1900, with the result that Chicago's filth was merely washed further down river, greatly degrading the Illinois as a scenic and aquatic resource. The channel, touted as a scientific wonder, reversed the flow of the Chicago River without the need for pumps and made continued expansion and habitation of Chicago possible--though it was not long before impacts downstream demanded that sewage be treated before it was dumped in the channel. This led to expensive sewage treatment plants and in time to a sludge-disposal problem which has been solved for the present by moving the wet material by barge for deposition on strip mined lands far removed from Chicago.

Yet we are still faced with the same problem--the mixture of wastes of the city with flood waters. This causes the capacity of the sewage disposal plants to be exceeded, and raw sewage and flood-borne detritus is spilled into the Chicago River and the Lake. A new scientific marvel, the Chicago Underflow Plan, is presented as the means of solving this problem and getting the city into another century. This design would abandon the natural floodplains and build a new river system 125 miles in length underground largely through solid rock, to handle nothing but floodwaters and associated wastes. It would be a tubular river 32 feet in diameter, more or less--the equivalent of a stream 100 feet wide and 8 feet deep. The diverted flows would end up in several large quarries where the wastes would be processed and returned to the rivers downstream.

Why We Have These Problems

Why are we continually faced with flood and drainage problems? The main reason is that we are so human. We like growth. We like change (or we are told we do). We love big machines, tall buildings, promises, big cities and optimism. These are human failings. But when a plant is too concerned with "flowering" it may find its roots and stems too feeble to support perennial life. There is a point beyond which further growth becomes a liability rather than an asset, when maintenance responsibilities usurp the energy of the organism, and when the growing tips are so far removed from the substrate that efficiency is greatly impaired. In short, severe environmental resistance confronts every effort to solve the simplest problem. That is the threat to the giant city. At one time Chicago put off solving its waste-water problems because it did not have enough people and enough big buildings to pay the bill. Now we have many people and many big buildings, but in the changed environment which has resulted their ability to contribute to the support of the community has been exceeded by the skyscrapering costs of the services they require. Assets, over time, have a way of becoming liabilities as a result of increasing environmental resistance.

This loss of environmental cooperation has come about as the result of many man-made activities:

1. The natural water storage capacity of the land which the city occupies has been nearly destroyed by sealing it with concrete and asphalt, by putting it under roofs, by usurping it with basements,

by removing or compacting or sterilizing the natural soils, and by eliminating prairies, marshes, and vast gravel deposits which once stored and filtered without cost.

2. We have speeded up runoff and aggravated floods by constructing gutters of a thousand kinds, by straightening stream channels and tiling of every low place, and by reshaping the topography.

3. The capacity of streams has been reduced by straightening and filling of old meanders and tributaries.

4. Large areas of nearly flat land often with inadequate drainage, have been added to the watershed by filling in water bodies.

5. We have placed impediments in the way of rivers in the form of levees, flood walls, buildings, and dams and by constricting flows with fill at certain sites. All of these raise flood levels, prolong flood crises, and cause sediments to deposit wherever flowing waters are made to confront obstacles. These deposits have a way of gradually extending upstream and thus subtly extending back-up flows over an increasingly wide area.

6. The physical fact of the city has modified the natural balance between evaporation, transpiration, and precipitation. One of the features of the prairie climate was that much of the moisture reaching the earth through rain was returned to the sky in the growing season by water loss from water bodies, plants and soils. But today, the quilted wick-like surface of the natural landscape has been replaced by smooth, non-porous surfaces which transfer much less moisture skyward.

It is also probable that air current alterations caused by tall buildings and canyon-like streets, plus the addition of particulates, heat and water vapor to the atmosphere by industrial and domestic activities have increased rainfall over the most built-up areas, so that there is more runoff to handle from the same acreage.

7. We have greatly increased the load of wastes in flood waters and hence cannot dump them with impunity into lakes and streams. Floods can no longer serve their primeval function of rinsing off the land and flushing out rivers. Their abnormal burdens of wastes now require treatment. These so-called "non-point" sources of pollution are real, and include all kinds of materials which originate or accumulate in streets, yards, roofs, drains, and highway and railroad rights-of-way. Some of this waste which sweeps down river with the first hard rain consists of aerial fallout or rain-borne material from agricultural, industrial, transportation or domestic activities. It would also include debris from building and wrecking projects; mud and hydrocarbons from vehicles; candy wrappers, kleenex, cigarettes and newspapers; excretions of humans, cats, rats, birds, and dogs; leaves, bark, bud scales, and flowers from trees; materials of every sort poured from cans, bottles, and buckets onto the ground or sprayed into the air; septic accumulations in shrunken stream beds and under culverts including dead fish, packaging, food wastes, lawn clippings, and old clothes; washings from roofing, paints and detergents applied to or washed or scraped from signs, buildings, windows, railings and vehicles; scraps from repair of utility lines and poles;

and countless other artifacts whose price, needless to say, never includes the cost of their disposal. Soils and soil organisms, once capable of detoxifying, burying, and digesting such substances, have been wholly removed or inactivated.

Today an urban tree is a liability in terms of the unprocessed, oxygen-demanding or toxic materials it adds, or causes to be added, to the runoff waters. When an environment becomes so vulnerable that we cannot reintroduce nature into it without making it worse, we should recognize how far we have come in disrupting the systems which formerly refreshed the earth and made the perpetuation of life and the purification of water possible.

Because of our methods of construction and false economies from the very first, we have made it all too possible for Chicago area flood waters to gain access to sewage waters, and hence to our sewage disposal plants, and in turn to our rivers and lakes in times of overloading.

My Objections to the Underflow Plan

A federal deadline declaring that this commingling and dumping has to be stopped may be beneficial if it encourages us to take action to correct the sources of the problem, but not if it locks us into an expensive, artificial, high-energy-consuming, and high-maintenance system such as the Underflow Plan promises to be.

Following are my objections to this plan:

1. Due to the extreme cost of the project, I doubt that it would ever be completed. If we compare the costs of the Underflow Plan ($5,700,000,000 + or -) with the cost of the Sanitary Drainage Canal as projected in 1893 ($22,000,000) we find that the new "solution" would cost 260 times as much as the old one, with perhaps the same life expectancy, but with far greater maintenance and operating costs. This seems out of all proportion to other increases since that time. For example, the population of Chicago has increased only about 6 times. The average daily consumption of water per person has increased from an estimated 150 gallons per day in 1893 to an average national-use figure of 1,600 gallons per day, an increase of 11 times. The Chief Engineer of the Chicago Sanitary District received a salary of $9,000 in 1893. Today this figure could hardly have inflated more than 7 or 8 times. The Chicago city budget, now $1,150,000,000 has increased 33 times. Excavation costs in 1893 were about 30 cents for a cubic yard of earth and about 80 cents for a cubic yard of rock. Today these figures would run only about 4 times larger. Average total construction costs, however, according to the Engineering News Index, are up 23 times since 1913, the earliest year of reference. Material costs are up 9 times; skilled labor up 20 times; and common labor up 45 times.

Common labor and City Hall seem to have been riding the crest of the inflation wave, and yet increased costs for these services are nearly a whole order of magnitude less than those represented by the proposed cost of the Underflow Plan. Of course, the multi-billion dollar cost of the latter can be partly explained by the fact that this project is a 125 mile long tunnel through rock, while the drainage canal was only 25 miles long, exposed to the sky, and less than half of the excavation in solid rock. Still, in cross section the tunnel is less than 1/5 the square footage of the canal, making volumes somewhat comparable. The cost of tunneling hard rock runs around $25 a cubic yard for large projects, about 30 times the cost of working hard rock in the open in 1893. These data help explain but do not justify the high figure for the Underflow Project. It is hard not to wonder what the reaction might be if the people of Chicago were told that their budget was going to increase 10 times in the near future. We are currently catching our breath and holding heated political debates over much smaller amounts. An increase of 260 times in costs for roughly comparable accomplishments separated by a period of about 80 years indicates, I believe as well as anything, that the projected costs exceed the capacity of the city, state, or nation to pay, and the projected advantages exceed the capacity of the people to benefit. To put it in every day terms, we would be mortgaging our future to buy a much more expensive house than we need, so that at retirement time (and cities reach that age too whether we like the concept or not) we could no longer afford to maintain it, pay the taxes, or the servants.

We should also consider that the Drainage Canal had the advantage of providing a variety of uses including navigation. The Underflow tunnel has only a single use--unless it is eyed as a place of refuge during a catastrophe of some kind. If this is the case, then the taxpayers who might be supporting it have a right to the information. Perhaps the lesson to be learned here is how much more economical a project can be when nature is cooperative--as it was with the Canal. As Trustee Bernard Eckhart said in the official inauguration of the project, "Nature has done much for us in the arrangement of a natural waterway....". (Brown, p. 441). We would do well to explore ways to continue this cooperative approach, rather than to literally butt our heads against a stone wall.

2. If completed, the cost of maintenance and operation of the Underflow Project could well become an insuperable burden, especially in view of the relative inaccessibility of the tunnels and the large amount of machinery needed. Trustee Lyman Cooley of the Canal project was well aware of the critical importance of low upkeep. He said: "Machines will vanish in rust, the proudest monuments of man will sink to rubbish heaps, and his greatest works trail in curious mounds, while this(canal) goes on as nature's self, an added feature to mother earth as though it had always been." (Brown, p. 434).

3. The project, once operative, would breed many new developments in present flood-prone areas. A "30 per cent growth factor" is projected in the Underflow Plan, but this is minimal, especially for

that area which is promised relief. Growth there could well exceed this figure many fold. The impact of this development could create a multiplication of problems and wastes while greatly decreasing the flexibility available for handling them by destroying what few natural advantages might still remain.

4. The flood protection benefits supposedly provided by this project are vague. I found no breakdown of their dollar value as related to specific portions of the project or to specific categories of benefits. I suspect that most of the "benefits" are largely hypothetical ones involving "inconvenience" type costs, such as occasional blockage of underpasses, hosing out of basements, moving of materials likely to be flooded, and momentary losses of time. Remedial actions, when needed in such cases, can commonly be accomplished by the individual in his spare time, and little permanent loss of property ensues. Aggravation there may be, but in a society as complex as that in which we live, we should treasure any problem small enough for the individual to solve by his own action or adjustment. This does not mean that I feel that individuals should not be recompensed where authorities have been negligent in quarantining flood-vulnerable areas from development, but if we are ever to have any realization of the costs of environmental degradation, we have to retain some individual involvement in the presence of cause and effect.

Many of man's problems in advanced societies are related to this separation of cause and effect. It keeps individuals and communities approving of and investing in causes, materials, developments, products, and gadgets which in the long run help produce the very conditions we are trying to ameliorate.

In any case, we should not try to extrapolate the inconvenience type of "expense" or "cost"--the "average flooded basement" for example--into a vast annual "benefit" in order to sell a project to the nation's taxpayers. If this Underflow Project is built and federally financed, it has been estimated that the average family in Montana would still be paying $1.50 a year 50 years from now to help this city keep its basements dry. The figures may not be exact, but the idea is there.

5. The philosophy that man can spend his way to success at the expense of nature deserves some serious examination. It does not seem to me that adequate consideration is given in discussions of the economics of the Underflow Project to certain costs such as the following:

A. Estimates of inflation at a rate of only 6% a year for the next 10 years seem extremely naive in view of the experience of this and many other developed nations in the last few years.

B. There seem to be no allowances in the budget for such inevitabilities as graft, strikes, accidents, emergencies, pay-offs and court cases. In some areas of the country these can be substantial.

C. The cost of investing $3.3 billion (or $5.7 billion or $6.4 billion as is variously reported for the whole project) in a hole in the ground seems totally out of proportion to the capabilities of the city to pay, if it had to pay, the interest on such a sum from its annual budget, and also out of proportion to the benefits which might be expected during the period of construction. Once completed, we must recognize that the project might be performing a critical service only a few days a year.

6. There is no consideration of the benefits of flooding. Instead, floods are regarded as uniformly bad. Actually, they perform useful purposes such as recharging of ground water, transportation of sediments down channels, the removal of nuisances of various kinds, and the lifting, sorting, and deposition of sediments and fertility on floodplains wherever natural vegetation exists. This latter service is a substantial contribution to the treatment and disposition of wastes and at the same time levels and raises the floodplain. To the degree that these processes are beneficial in particular sites, they should be considered as credits for the existing order, and as liabilities against any project which brought them to an end.

7. There is no discussion of how this project might relate to, impact, or duplicate other projects already planned or under construction in the watershed, such as the Des Plaines River Floodwater Management Plan, or the program of the State Waterways Department and other agencies to map, zone, or restrict floodplain development.

8. There is no discussion of the problems of preventing this project from either draining large quantities of water from the underground aquifer, or from polluting it. With inadequate grouting, poor maintenance, or earth movements, large 62<

gallonages of native water might be added to that required to be treated which would recreate the basic problem. If the water table is below the tunnels, then there is a reverse danger of waste water under pressure intruding itself into the underground water supply. The chance of polluted waters in abandoned quarries leaking out into surface or subsurface waters also deserves study and concern.

9. No mention is made of what will be done with the rock wastes generated from excavated tunnels. The chances are that there will be some huge crushing plant or dump which will preempt natural land or floodplain, or create some objectionable feature or pollution. Dust and noise will inevitably be generated by truck, machinery, and worker traffic associated with the project. These effects and all the elaborate equipment and personnel required to monitor these and other environmental impacts are costs properly chargeable against the projects, whether the surveillance is conducted by public agencies, private organizations or residents of the area.

10. It is quite probable that the total inconvenience generated among home owners, commuters, and pedestrians by traffic, noise, dust and other pollution during the proposed 20 year construction period would at least equal the inconvenience of the flooding during the same period. Thus, for the better part of 20 years, or until the project becomes fully operative, the city will be doubly inconvenienced--at a very high price.

11. Parks and existing nature preserves would be greatly endangered during construction because they offer the path of least resistance for earthworks, construction roads, parking, and detours. After the project is completed and development moves in, these unique areas would become overused canyon bottoms, with maintenance and patroling costs increasing greatly.

12. The implication is given in the report of the Underflow Project that there will be virtually no impact on sites of historical or archeological interest. This seems overly optimistic in view of the often repeated observation that the area of the lower Des Plaines, Summit and the Chicago River is one of the most important historical areas in the entire continent.

The Natural Basis of River Restoration

Back in the last century, Mark Twain, ruminating over the expensive program of the Corps of Engineers said that it might be cheaper for the Corps to buy new ground and build a new Mississippi, instead of trying to remake the old one. This remark was made in jest, but it seems to be an approach now taken in all seriousness by the proponents of the Chicago Underflow Plan when they advocate this new underground river.

In the Chicago area nature expended untold time and energy wearing away the rock, transporting and redistributing the wastes and creating attractive valleys useful for wildlife, plants, and people. These valleys were engineered almost to perfection for roads, portages, canals, and drainage systems. But nature just didn't count on people usurping the landscape and the waters to the extent that they did. Now, as we seek to solve some of the problems of that usurpation, we contemplate undertaking all the infinite labors of nature in order to correct a long series of human aggressions. It is proposed that we assume responsibility, apparently forever, for the management of a new river system even though with some encouragement nature is still willing to manage the old one for little or nothing.

In place of marshes and river bottom woods to sift out silt and to process chemical wastes from diffuse sources, we will have big holes (quarries) filled periodically with dirty floodwaters which, to keep them from smelling, will have to be stirred, pumped, sifted and aerated by machinery. Instead of the operation generating energy and variety in the form of vegetation and animals, it will consume energy and restrict flexibility. The riverscape, instead of demonstrating the dynamic cause and effect relationships everywhere visible in nature, will be hidden from view and subject to the vagaries of human manipulation. Instead of water and silt running down to the sea by gravity, we shall have to pump it up and around forever.

If we would design a river system, we would do well to design one which works with nature, one that is not subject to instant catastrophe as a result of a single mechanical failure, a strike, or an act of sabotage. Do we want a river that gradually becomes non-functional because of poor workmanship, penny-pinching, politics, or inflation? Rivers should be objects of beauty and pride in a community, and should be shared in all their moods and eccentricities. A river in a tunnel is not going to generate any great dedication such as produced music in the minds of the beholders of the Blue Danube or the Moldau. One of the few places in the Chicago

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area where I have found any affection remaining for a river is in the town of Riverside where the town was designed with the river in mind, and where a semblance of a natural river, complete with gravel bars and a floodplain forest still remains.

It is the rich first flow of floods that has created rich floodplains the world over. Why not give our urban rivers space and opportunity to reestablish a natural pattern, and in the process be enriched by new acquisitions of floodplain forest, wet prairies, and duck marshes all serving as filtering places for floods. Some would add: "and breeding places for mosquitoes", but certainly the ills and illnesses of the unrelieved urban environment today generate more inconvenience, malcontent, and sickness than any natural midwestern environment has ever done.

While I am not in favor of the expenditure of so many billions of federal taxpayer dollars on any program to salvage any city from its own over-development, it is interesting to speculate on what might be done with the kind of money proposed for the Underflow Plan. Three and three-tenths billion dollars, the supposed cost of the basic portions of the Underflow Plan, would buy 50 square miles of flood-prone land at a price of $100,000 an acre. If we think in terms of the six and four-tenths billions cost for the whole project with associated works, the purchase price for floodplain property could go up to $175,000 or so, not a bad profit for most property owners. Even if only 25 square miles could be purchased, this would permit a floodplain 125 miles long free of developments for 500 feet in the headwaters and 1500 feet in the lower half of the river. Existing preserves in the floodplain of the Des Plaines would extend these benefits greatly. 66<

Of course, it is quite probable that funds in these amounts would never be made available for these purposes, for the purchase of land and its preservation in a protected or natural state is commonly considered a cost. In some government "cost" studies such as the Des Plaines River Watershed Floodwater Management Plan, purchase and preservation are even listed under "adverse effects". This is of course a patently absurd kind of economics, for the preservation of natural land cannot be an adverse effect, and in most cases it would be a beneficial and money-saving effect. This points up one of the deepest deficiencies in our whole approach to resource development.

There would be many advantages in having a wide open floodplain where the works and workings of the river are all open and above board and accessible to natural vegetation, to people, wildlife, winds, heat flow and water recharge, useful for noise absorption, precipitation of flood flotsam, and filtration of particulate matter from the air and rainfall.

One of the chief objections to the return of developed land to open space would be the loss of "tax base"--but these days it has become quite apparent that many properties cost a municipality more to service than they produce in taxes. The financial crisis in large cities undoubtedly reflects this situation to a large degree. This would be especially true of properties on floodplains not only because of the added responsibilities which such developments entail, but because the floodplain is capable of performing a useful service in its undeveloped or restored condition. 67<

The suggestion that Chicago should stop all further destruction of nature within its boundaries and revegetate and restore wherever it can conflicts with the prevailing philosophy that the city must grow, but that policy should be recognized for what it is--the result of a time when the nation had unlimited space and vast numbers of people were moving to the city and bringing "wealth" into it. Now there is no longer any justification for the continued destruction of what remains of urban nature in the name of "progress". It is not progress but retrogression.

Without committing sociological mayhem, and with as much sensitivity as possible for neighborhoods and individual lives, we should "phase-out", purchase, or individually treat flood prone areas and houses in such a way as to make them less vulnerable to flood damage, less obstructive to floods, and more efficient in holding rainfall and cleansing runoff. In many areas fill should be removed, while in others, basements should be abandoned. Basements, after all, are not an absolute necessity. On the contrary, where flooding is of continuing occurrence and it is not possible to forego use of a particular site, all "improvements" should be raised on stilts and piers, a practice developed even in the most ancient societies when the occupation of flooded areas seemed advisable.

Every road, every yard and roof and vacant lot and parking place should be examined for potentialities for short-period water retention within the limits of public health. Water table recharge areas could undoubtedly absorb large quantities of runoff, provided it did not contain toxic substances or large quantities of suspended or dissolved organic matter. Here again floodplain areas could probably make a substantial contribution. In certain stretches of streams in the Chicago area it is well documented that substantial quantities of the flow are thus lost from the stream by percolation.

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When these underground reservoirs are full in spring then the threat of floods is substantially increased. It is possible that a practice could be established in some areas without unduly disrupting surface conditions, or affecting aquifer quality or production, of lowering subsurface water in late winter so that these reservoirs were available for retention of spring floods. This depletion occurs more or less naturally each summer and fall, so that heavy fall and early winter rains seldom cause substantial floods. Late winter and spring rains, on the other hand, occur when underground deposits are filled to capacity, or are inaccessible for various reasons. Limestone and dolomite aquifers may present special problems because of their vulnerability to pollution. This idea would have to be carefully explored for dangers and potentials.

One of the critical factors which makes these subsurface storage areas inaccessible at times of late winter and spring floods is the freezing of the topsoil. This is further argument for restoring and protecting natural vegetation areas where natural leaf mulches, air space provided by a multitude of organisms, and long lingering snow help to limit the depth to which cold penetrates and soils freeze. Man-made or maintained "open space" seldom contributes materially to this effect, and rather favors deep freezing and high runoff.

It is even possible that we should regard the water holding capacity of underpasses as advantage rather than as obstacle. High water lanes could probably be constructed under most of these to permit average height vehicles to pass during high water without diminishing traffic flow during normal times. That is, instead of fighting floods, we should adapt to their inevitabilities.

Dam Removal

Perhaps the most effective single action that might be taken to decrease flooding and back-up problems along the Des Plaines and Salt Rivers would be the removal of dams placed there during the last century, first for mill power, and then for cosmetic or recreation purposes. The Hoffman Dam at Riverside is a good example. It is an ironic fact that this dam was recommended by Frederick Law Olmsted in his original recommendations to the Riverside Improvement Company (1868):

> "It will probably be best to increase the height of the mill-dam so as to enlarge the area of the public water suitable for boating and skating, and so as to completely cover some low, flat ground now exposed in low stages of the river. At the same time, a larger outlet should be provided to prevent floods above the dam from injuring the shore."
>
> (In Civilizing American Cities, S.B. Sutton, Ed. M.I.T. Press. 1971)

Even though Olmsted understood water, he failed to anticipate to what extent this dam would ultimately cause flooding and poor drainage upstream. He would be surprised now to find that these very recommendations had created conditions which were being seized upon as reason for projects which could threaten the integrity and scenery of the town site he designed. One of these, the Des Plaines River Watershed Floodwater Management Plan would remake the watershed using a series of reservoirs, diversion channels, and levees. One of these levees would be installed across from Riverside on a piece of attractive floodplain forest which is a major landscape element of the town and a green cushion ameliorating the spate of noise and development which threatens the habitability and identity of Riverside and adjacent communities. With or without the Hoffman Dam, there is no justification for leveeing of this woods, for it would eliminate one more natural flood relief valve, one more detritus processing plant, and create in its stead a constriction in the channel of the river. That such recommendations can still find their way into government studies at this late date can only be attributed to direct interference or influence on the part of interested individuals or corporations.

What the relationship is between the Des Plaines Watershed Plan and the Underflow Plan is not, I believe, described or detailed in either study, but they would appear to have substantial impacts on each other. In some cases they are trying to solve the same problem in different ways. Neither project takes a very enlightened view of the use and preservation of the natural landscape and natural process. In any case, it is more than probable that much of this elaborate planning could be scrapped if floodplains were preserved and restored, and these dams on the Des Plaines removed gradually and the river allowed to seek its former natural level, i.e., the top of the limestone which caused Riverside to be the site of a most important Indian Ford in the early days. Upon reaching the limestone, the stream would increase its lateral amplitude, causing erosion of the banks. Unless there is a buried channel in the limestone this would be the lowest elevation to which the restored stream would obtain.

Since the dams have been in place for many years, they should not be removed by a charge of dynamite. This would be followed by a torrent of mud and water, and unmanageable caving for many years. While it is contrary to the usual regime of modern demolition philosophy, only six inches or a foot of dam height should be removed a year. Perhaps the same effect could be produced by gradually lowering the spillway gates. Time must be given for the landscape to readjust its contours, for adjacent land owners to adjust their properties, and for sediments and trash accumulated behind the

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dams to be removed gradually. Wherever possible as the stream lowers itself, effort should be made to restore some of the original meanders of the stream.

Removal of dams will result in scouring, declining water tables, declining flood heights, and declining deposition upstream but deposition downstream. Where there are several dams in sequence the deposits washed from one will tend to be deposited above the other, creating for a time a somewhat stepped grade in the stream bed. Ways might be found to trap these bonanzas of eroded sediments downstream. The floodplain forest opposite Riverside would be in a critical position for catching substantial quantities of muds washed from the Hoffman Dam. Further downstream where the grade flattens out, lands might be built up through a system of "colmatage", or "filling-up" as utilized in the Low Countries for trapping of river sediments for the construction of agricultural lands--an adaptation of the natural system of building floodplains and coastal plains.

Fortunately substantial forest preserves exist in the lower Des Plaines which might supplement this kind of project, and help keep sediments from moving all the way to the lower Des Plaines and Illinois. New lands thus created might be compatible with the use of sewage plant products--if and when such products can be shown to be free of toxic persistent chemicals such as PCB's etc., as well as odors and aerosols. Unfortunately the maze of transportation arteries and canals near Summit would present many obstacles, as they would elsewhere in floodplain areas.

I would emphasize that I have not made a detailed study of the feasibility or consequences of dam removal, but it seems a logical starting place for any plan aimed at stopping floods and back-up sewage in the Des Plaines Valley.

The Chicago River

With regard to the Chicago River watershed (if such it can still be called) the problem centers about the fact that the landscape has been virtually waterproofed, both river branches have a low gradient, large amounts of wastes from diffuse sources reach the channels, and sewage treatment facilities are inadequate to treat or store sewage flows that are augmented during floods with storm water. This situation was well appreciated even in the last century, as the following comments by a special "Board of Commission" appointed by the City Council and Board of Trade in 1865 would indicate:

> "With regard to the North branch, while we consider the proposed open canal from the lake to the river along or near Fullerton Avenue the best plan to recommend for permanently cleansing it if the discharge of filth into it must be suffered to go on as heretofore, we believe it is both the right and the duty of the city to prevent all such discharges. This would be by far the simplest, cheapest, and quickest way of purifying that branch; in fact, the only method we can think of to obtain immediate as well as permanent relief." (p. 82)
> (G. P. Brown, Drainage Channel and Waterway
> R. R. Donnelley and Sons, Chicago, 1894)

This situation continues to be a problem of keeping pollutants from reaching the river and the lake. Lake Michigan is still viewed as a vast flushing reservoir, available to dilute the polluted streams, but there are still times when floods or declining lake levels cause this scheme to fail.

It is a sad probability that there is still no solution for the Chicago River except to keep all waters entering the river as clean as possible. Since many of these sources are "diffuse", this will take a citizenry bent on a common mission urged on by inspired leadership. Recent visitors to China comment on the sparkling cleanliness of the cities. Cannot a democracy do as well? The responsibility for a clean city, for a beautiful river now falls almost entirely upon mankind, the individual man, for there is no nature left to work with, no flexibility left, no responding entities left to jump to the aid of man. Unfortunately the illusion that man can survive without nature, through technology, computers, concrete, appropriations and compromise still prevails. Yet it should be obvious to all by now that city problems have reached the point where greatly increased portions of budgets must be used for maintenance, repair, and replacement of existing facilities, for collecting garbage and disposing of sewage, for keeping the air breathable and the water drinkable. Maintaining life for the existing citizenry in existing buildings with existing utilities consumes much of the city's resources. New buildings put in open space may at first bring in more income, but as they age and are enclosed by developments which they themselves spawn, the profit margin drops, cleanliness declines, and floods increase. Appeal is made for more lake water to flush more filth down the Chicago River into the Drainage Canal but even if navigation and downstream interests would grant that favor, it would only delay the time when it becomes apparent that the basic assumption is wrong. Lake Michigan was not put there to dilute the dirt of Chicago. It is there to admire and to protect. Chicago, divorced as it is from nature of every kind except human nature, is going to have to be "self cleaning". The people and the corporations are going to have to fall in love with their streets, their skies, their homes, and their waters--and this is not easy in the impersonalized unnatural landscapes of today.

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EPILOGUE

I must admit that my suggestions are made with a certain amount of "tongue-in-cheek", for I am afraid that Urban Man has now been too long separated from nature to be anything but skeptical of natural processes. Most people would not even recognize a floodplain or a prairie, or their potentialities. While I don't believe we are all ready to love the gigantic and the noisy, by the same token we are not apt to demand a rededication to the "whole environment" when it no longer exists.

Yet we are in a quandary, for the average city person has not yet undergone sufficient disillusionment with existing trends--even in view of the plight of New York City and many others. Each resident seems to feel that what has happened to other communities, to other societies, will never happen to his own. I am afraid that conditions will have to get much worse and then it will be too late to follow any other path than one of senseless destruction and violent reaction such as are already occurring in scattered places. If there is any consistent observation it seems reasonable to make, it is that each city must suffer its own crisis before it believes in its own vulnerability--that is, each city except Riverside where the benefits of sharing the environment with nature have made most of the residents more perceptive.

Respectfully submitted,

Alfred Etter
November 28, 1975

VILLAGE OF WILMETTE
WILMETTE, ILLINOIS 60091

PHONE
312. 251 2700

April 22, 1976

Mr. Harland D. Hirt
Chief, Planning Branch
USEPA, Region V
230 South Dearborn Street
Chicago, Illinois 60604

Re: USEPA - DRAFT ENVIRONMENTAL IMPACT STATEMENT TARP (MAINSTREAM TUNNEL SYSTEM)

Dear Mr. Hirt:

The Village of Wilmette strongly supports the Mainstream Tunnel System (TARP) proposed by the Metropolitan Sanitary District to reduce pollution and aleviate flooding in the Chicago Metropolitan area.

The Village has experienced severe basement flooding during heavy rain storms, causing thousands of dollars in damage to property. This "Deep Tunnel" system will provide an outlet for the flood waters and reduce stream pollution.

Sincerely,

John F. Scapin

JOHN F. SCAPIN, Dir. Public
Works Group/Village Engineer

JFS:k

cc: Frank E. Dalton,
Assistant Chief Engineer
Metro. Sanitary District

10 WEST HUBBARD STREET

STATEMENT BY HARRY WEESE, FAIA
FORMER MEMBER OF THE PRESIDENT'S ADVISORY
COMMITTEE ON ENVIRONMENTAL QUALITY

(Revised 4/20/76 - to supersede statement of 4/12/76)

In response to the Metropolitan Sanitary District of Greater Chicago's Deep Tunnel and Reservoir System.

Public works have always been among the greatest feats of mankind. The "Zuyder Zee" turning around of the Chicago River, for example.

In these times of energy and ecology awareness many large, new and complicated public works are being designed to safeguard the environment. Despite good intentions some of the solutions may have effects contrary to those intended.

One high energy public work now quietly being dug at the price of several hundred million dollars a year is the Tunnel and Reservoir System (TARP). It involves the channeling, collecting, containing, and pumping of periodic floods which now overspill into the canal system and sometimes into Lake Michigan (twice last year). The system, which is designed to avoid any overspill into the Lake and limit overspills into the canal to four times yearly, involves the

CHICAGO 60610

expenditure of 6.4 billion dollars. This initial cost capitalized at 6 1/8% over 50 years equals $20 billion at the rate of $415 million a year.

This system also would provide secondary treatment of storm water for presumed downstream benefits and would stop the flooding of basements and viaducts.

This is done at the risk of:

a) diminishing the periodic and beneficial flushing of the river and canal system;

b) draining water out of insoak areas, denying subsurface aquifer replenishment and having that water which formerly went to the aquifer, not the lake, count against our meager allocation of 3200 cts. measured at Lockport;

c) depriving overspill pollutants and nutrients from the natural processing of sun and air on the surface;

d) channelization which lowers ground water and consequent drying up of wells which would augment the intrusion of pollutants into the aquifer from the tunnels;

e) using great quantities of energy to pump the storm water 215 ft. against gravity after flooding.

When the 1936 decision drastically cut back lake diversion and availability of lake water to the growing metro region, wells were drilled and the increased pumping brought down the ground water level.

Today there isn't any evidence that the difference in diversion before 1936, 10,000 cubic feet per second and today 3200 cubic feet per second, has any significant short or long term effect on the lake level cycle.

Grave questions must be raised as to the logic and necessity of such a gigantic expenditure forced on the Chicago region by the workings of EPA and the 1936 decision. One must ask if EPA hasn't usurped the executive, legislative, and judicial functions of the local democratic process in this question. The public is invited to witness TARP as a "fait accompli". Alternatives to the present TARP were not presented to the public in a form intended to encourage understanding and debate. Options weren't available.

Are we to assume that the political decision of forty years ago will stand the light of reason and necessity in respect to effects to navigation and hydro power?

What is the cost of buying a flood plain or building a Calumet Harbor storm retainage basin? When was the last typhoid epidemic? At what level of dilution are wastes dangerous? How clean is clean? EPA treats human waste as a pollutant. Oriental agriculture treats it as a nutrient.

Those who care and dare to question sanitary engineering and fiscal wisdom of this enormous priority in light of the acute scarcity of public funds could wonder if in this case the cure is not worse than the disease. Or in simpler terms, since we have lived with it for nearly half a century without probable health hazard, is this trip really necessary?

10 WEST HUBBARD STREET

STATEMENT BY HARRY WEESE, FAIA
FORMER MEMBER OF THE PRESIDENT'S ADVISORY COMMITTEE
ON ENVIRONMENTAL QUALITY

In response to the Metropolitan Sanitary District of Greater Chicago's Deep Tunnel and Reservoir System.

Public works have always been among the greatest feats of mankind. In these times of energy, ecology, and awareness large new public works are being designed to safeguard the environment. Despite good intentions some of the solutions may have effects contrary to those intended. One very large high energy public work now quietly digging at the price of several hundred million dollars a year is the Deep Tunnel and Reservoir System (TARP). It involves the channeling, collecting, containing, and pumping of periodic floods of storm water which now overspill into the canal system and sometimes into Lake Michigan (twice last year). The system which is designed to avoid overspills into the Lake (questionable) and limit overspills into the canal system to four times yearly involves the expenditure of 6.4 billion dollars which, capitalized at 6 1/8% over 50 years, equals $20 billion at the rate of $415 million a year.

This system also provides secondary treatment of storm water for presumed downstream benefits and stops the flooding of basements and viaducts.

This is done at the risks of:

a) diminishing the periodic and beneficial flushing of the river and canal system.

b) keeping water out of insoak areas, drying up insoak areas, and depriving the subsurface aquifer of replenishment.

c) removing pollutants and nutrients by natural process of sun and air.

d) the lowering of ground water wells and drying up of wells which would augment the intrusion of pollutants into the aquifer.

e) using greater quantities of energy to pump the storm water 255 ft. against gravity.

When the Treaty of 1936 cut back diversion the water quality in the river system was adversely affected. So was the aquifer as increased pumping brought down the ground water level allowing intrusion.

Today there isn't any evidence that the difference in diversion before 1939, 10,000 cubic feet per second and today 3200 cubic feet per second has any significant effect on the lake-river cycle.

Grave questions must be raised as to the logic and necessity of such a gigantic expenditure forced on the Chicago region by anonymous federal scientists regarding EPA rules. One must ask if EPA hasn't usurped all of the functions -- executive, legislative, and judicial -- of our democratic process in this question. How clean is clean? When was the last typhoid epidemic? At what level of dilution are wastes dangerous? EPA treats human waste as a pollutant. Oriental agriculture treats it as a nutrient.

Those who care and question conventional wisdom in sanitary engineering and the fiscal wisdom of putting such a high priority on the matter could wonder if in this case the cure is not worse than the disease.

4/12/76.

REVISIONS TO THE DRAFT

Minor changes to be made to your copy of the Draft EIS are listed below. Please make these changes in pen on your copy. Pages with more extensive changes have been retyped, and a mark in the right margin indicates the location of the change. Please insert these pages in your copy of the Draft EIS and discard the original page.

ERRATA

Executive Summary

1. p. v, second paragraph, third line: delete "MSDGC-owned."
2. p. xv, third paragraph, next to last line: change "17.3" to "17.1."
3. p. xxv, second paragraph, sixth line: delete "and North-Side."
4. p. xxvii, footnote #12, last line: change "food" to "flood."
5. p. xxxx and p.xxxxi: change page numbers to p.xxxxi and p. xxxxii.

Chapter I

1. p. I-6, third paragraph, tenth line: change "10 MGD" to "70 MGD."
2. p. I-7, first paragraph, third line: delete "MSDGC-owned."

Chapter II

1. p. II-13, third paragraph, next to last line: change "Elevetion" to "Elevation."

2. p. II-21, third paragraph, fourteenth line: change "9,100" to "9,200."

3. p. II-75, fourth paragraph, last line: change "II-22" to "II-27."

Chapter III

1. p. III-2, last paragraph, eighth line: change "accellerated" to "accelerated."

2. p. III-13, second paragraph, fourth line: change "Landale" to "Lawndale."

3. p. III-24, last paragraph, second line: change "1969" to "1970."

4. p. III-26, next to last line: change "connecting" to "collecting."

Chapter IV

1. p. IV-29, second paragraph, sixth line: change "management" to "maintenance."

Chapter V

1. p. V-4, next to last paragraph, last line: delete "or to be pumped out."

Chapter VI

1. p. VI-3, first paragraph, eighth line: change "1.940 MGD" to "1,940 MGD."

2. p. VI-14, third paragraph, first line: change "Tunneling" to "Tunnel."

Chapter VII

1. p. VII-16, second paragraph, fourth line: delete "major."

Chapter VIII

1. p.VIII-33, fourth paragraph, fifteenth line: change ".3" to "0.3."

NEW PAGES

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Pollutant concentrations in the streams and rivers presently exceed water quality standards established by the State of Illinois Pollution Control Board. Concentration ranges of various pollutants in the Chicago area's surface systems are presented in Table II-1. Further details on the water quality of specific water systems are presented in Section 2.1.1 of the EIS.

Table II-1
Summary of Pollutant Concentration Ranges in Chicago's Surface Water Systems

Pollutant	Chicago River — Sanitary and Ship Canal System	Calumet River System	Des Plaines River System	Applicable Illinois Standards* Secondary Contact	Applicable Illinois Standards* General Use
Dissolved oxygen (DO)	1.2 to 7.7 mg/l	3.9 to 9.0 mg/l	6.0 to 10 mg/l	5.0 mg/l[1] 4.0 mg/l (1978)[2] 3.0 mg/l 4.0 mg/l min.[1] 2.0 mg/l min.	6.0 mg/l 5.0 mg/l min.[3]
Biochemical oxygen demand (BOD)	5.2 to 9.2 mg/l	4.1 to 7.3 mg/l	5.0 to 6.7 mg/l	4-20 mg/l[4]	4-20 mg/l[4]
Ammonia (as N)	0.8 to 6.2 mg/l	1.3 to 13 mg/l	0.3 to 1.2 mg/l	4.0 mg/l (winter) 2.5 mg/l (summer)	2.6 mg/l[3]
Suspended solids (SS)	19 to 54 mg/l	12 to 73 mg/l	29 to 68 mg/l	5-25 mg/l[5]	5-25 mg/l[5]
Fecal coliform	477 to 12,700 (counts/100 ml)	152 to 738 (counts/100 ml)	411 to 8,700 (counts/100 ml)	1000/100 ml[1]	200/100 ml[2]

* Effluent discharge standards apply if water quality standard is not designated.

1 North Shore Channel Standards

2 Chicago River-Sanitary and Ship Canal System and Calumet River system.

3 General Use Standard applicable to Des Plaines River system.

4 4 mg/l-Hanover, Egan, and O'Hare Sewage Treatment Plants
1[illegible] mg/l-WSW and Calumet Sewage Treatment Plant
20 mg/l-Lemont Sewage Treatment Plant

5 5mg/l-Hanover, Egan, and O'Hare STP
12mg/l-WSW and Calumet STP
25mg/l-Lemont STP

Serious public health problems involving contamination of Chicago's drinking water supply has led to implementation of regulatory measures to protect Lake Michigan, an important drinking water resource, from pollution. Locks and gates have been installed to divert river flows away from Lake Michigan, allowing eventual drainage into the Illinois River. Lake Michigan supplies most of the drinking water for the Chicago area. The withdrawal amount is approximately 1,600 cubic feet per second (CFS), and the maximum amount that can be withdrawn from Lake Michigan is 3,200 CFS.[1] This withdrawal limit, or allotment, is presently divided into three usage types: domestic water supply, indirect waterway diversion, and direct waterway diversion. The diversion usages allow improved effluent dilution and improved navigation.

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[1] Supreme Court Decision.

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In the Chicago metropolitan area, there are two main aquifer systems: the upper aquifer, which consists of glacial drift and dolomites, and the lower aquifer, which consists of dolomite and sandstone formations. Unconsolidated Quaternary deposits and Silurian dolomites of the upper aquifer are hydraulically connected and function, in most areas, as a single water-bearing unit. Clayey deposits in the glacial drift act as confining layers to create artesian conditions in the upper aquifer. The lower aquifer includes dolomite and sandstone formations extending from the base of the Maquoketa Group to the top of the Eau Claire shales of the Cambrian system. The average thickness of the upper aquifer and lower aquifer is approximately 400 feet and 1,000 feet, respectively. The sources of recharge for the groundwater in the upper aquifer are infiltration of precipitation and influent streams. The lower aquifer is recharged in parts of McHenry, Kane, and De Kalb Counties where the Maquoketa Group outcrops, and further west where the Group has been removed by erosion. With respect to using the aquifers as a water resource, studies indicate that the lower aquifer is capable of producing about 25 Million Gallons per Day (MGD) and the upper aquifer is capable of a potential yield of 108 MGD.

Discharges into the waterways of the Chicago area originate from several sources, including: wastewater treatment facilities, industrial plants, and combined-sewer overflows. Six wastewater treatment facilities currently discharge treated water to existing waterways. The outfalls are located adjacent to the facilities. Most of these facilities are in compliance with the BOD and SS effluent standards (under present permit conditions), and two smaller plants are within the ammonia-nitrogen standard. With respect to industrial plants, wastewater is conveyed to treatment plants and processed before discharging. The industrial waste load averages approximately 195 MGD or equivalent to a population of 4.5 million. Combined-sewer overflows, which occur about 100 times per average year, inject pollutants in large amounts into waterways at approximately 640 outfall points in the Chicago area. During such events, minimum Illinois water quality standards established for restricted-use waters are not met.

Numerous water resource management programs have been initiated to address the flooding and/or pollution problems of the Chicago area. These programs have been or are currently being conducted either regionally or locally. A few of these programs include: the Section 208 Areawide Waste Treatment Management Planning program, the Chicago-South End of Lake Michigan study (C-SELM), the City of Chicago should result in a strengthening of the urban centers and a lessening of the outward population movements. Chicago's population is expected to stabilize after 1980.

Contract construction income accounts for less than eight percent of total earnings in the Chicago region. While average monthly wages for construction employment are high relative to other industries in the Chicago region, total earnings from contract construction have ranged from 6.5 to 7.7 percent of total earnings over the period 1950 to 1971. The construction industry is heavily unionized, and the current union hourly wage rate averages $11.02. (Refer to Table III-6 of the EIS).

Chicago has traditionally sustained strong construction activity in the public and private sectors. Major public redevelopment projects have stimulated private investment and development, particularly within the city of Chicago. Construction employment opportunities have thus attracted and created a large construction labor force. Construction employment in the Chicago SMSA numbered 136,897 people in 1970 or approximately 4.8 percent of the total employed. Construction employment in the Chicago SMSA accounted for 61 percent of total construction employment in the State of Illinois. The Chicago area construction work force is highly flexible and can expand rapidly, given the demand for construction services.

2.2.2 Land Use

The predominant land use bordering the Mainstream Tunnel route can be characterized by its industrial zoning; large portions are underutilized and vacant. The notable exception to industrial land use is commercial development characteristic of the Central Business District (CBD) which borders the tunnel segment following the Chicago River from Lake Michigan to Wolf Point. There are no residential land uses bordering the tunnel route. Rock taken from the tunnel will probably will be disposed of at McCook, Stearns, and Thornton quarries. Sludge will be disposed of at a number of sites or by a number of programs, including: the Fulton County project, NuEarth, broker sales, Lawndale Lagoons, and other landfills.

The land areas bordering the proposed tunnel route are expected to change to park, cultural, and recreational uses in the CBD-related sections but remain generally the same along other segments. Implementation of the Chicago 21 Plan would realize the Riveredge Plan, affecting redevelopment bordering the Main Branch of the Chicago River from Lake Michigan to Wolf Point. Substantial new recreational park development along the riveredges are envisioned.

Plans also call for the strengthening of the North Branch Industrial Area. Industrial uses along the Sanitary and Ship Canal are likely to continue because of the need for low-cost water transport. Improved water quality in the river and the canal plus storm water management would enhance the proposed Riveredge Plan and would help strengthen the industrial areas.

2.2.3 Sensitive Areas

There are no known archeological or historically significant sites bordering the tunnel route. MSD is presently investigating areas adjacent to planned tunnel routes. There are selected sites of historic and architectural interest within the vicinity of the tunnel route, but none within the immediate 500-foot impact area of the tunnel. These sites are listed on pages III-16 and III-17 of the EIS.

2.2.4 Financial Resources

Financial resources are currently available to fund the Mainstream Tunnel system. TARP's Phase 1 tunnel system cost breakdown is approximately $1.03 billion[1] for water pollution elements and $0.81 billion for flood control measures. Operation and maintenance of TARP has been estimated at $13 million annually. The estimated cost of the Mainstream system alone is $508.2 million, with an annual maintenance cost of of $2.3 million.

Analysis of the funding resources required to finance the Mainstream Tunnel system reveals that sufficient funds are currently available from the Federal Government, the State, and the MSDGC. (See Section 3.3.1 of the EIS). Additionaly Federal Water Pollution Control funds of approximately $221.0 million and MSDGC funds of about $73.5 million will be required to meet the implementation plan for the other conveyance tunnel systems. In view of the sound fiscal posture of the MSDGC, the high funding priority assigned TARP by the State, and the very conservative estimates of future Federal appropriations, it can be reasonably assumed that future financing requirements can be satisfied.

Maintenance costs can either be covered through an _ad valorem_ property tax, or through a user charge system based on water consumption. EPA favors the latter approach and has awarded the MSDGC two grants to develop such a user charge system.

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[1] Cost estimates based on values presented in MSDGC's "Facilities Planning Study—MSDGC Overview Report," January 1975.

2.2.5 Labor Resources

Labor resources are considered adequate to meet construction and implementation needs of TARP and other projects. The diversified labor force in the Chicago metropolitan area is vulnerable to economic recession because of the emphasis upon manufacturing and nonservice employment. Thus, while national unemployment was about 8.4 percent in the third quarter of 1975, Cook County had a 9.6 percent rate, and the city of Chicago sustained a 11.2 percent rate of unemployment. Increasing productivity rates and an expanding labor force should contribute to keeping Chicago unemployment levels higher than the national rate for the next few years. Therefore, new employment opportunities presented by TARP and other projects should not experience a shortage of labor resources.

The labor force is predominantly male, with white collar workers comprising 53 percent of the labor force in the SMSA.

2.2.6 Transportation

Implementation of the Mainstream Tunnel system will involve use of roadways and waterways. Trucks carrying rock and spoil material from construction sites will utilize several surface streets and expressways in reaching the quarry sites. The roadways range from two-lane streets to six-lane divided highways. The Mainstream Tunnel route also is proximate to major Chicago waterways; the North and South Branches of the Chicago River and the Sanitary and Ship Canal. Other portions of TARP will be near the Calumet and Little Calumet Rivers, and the Calumet-Sag Channel. Waterborne commerce is important to the Chicago economy; of the 46.2 million tons of waterborne freight traffic handled by the Port of Chicago, 37 percent or 17.1 million tons are moved over the inland waterways.

2.2.7 Major Projects and Programs

Major projects and programs proposed over the next ten years in the vicinity of the Mainstream Tunnel route consist mainly of transportation system improvements. Major transportation-related improvements which are proposed include:

evaluated in detail with four selected alternatives and the "no-action" alternative. In this evaluation, 15 significant environmental impact parameters were identified as the basis for evaluation. The FCCC concluded that very few negative impacts are expected for any of the alternatives incorporating conveyance tunnels, and that adverse impacts will occur if the "no-action" alternative is chosen. The FCCC also concluded that the construction impacts of all plans on the environment will most likely be relatively short-term and localized. Finally, the beneficial impacts of the plans will far exceed the adverse impacts. Within the scope of the FCCC analysis, TARP had the highest ranking and was selected as the most suitable plan to solve the flood and pollution problems of the Chicago metropolitan area.

TARP would provide the most benefits for the lowest cost and the least adverse environmental impacts. Field studies and subsurface exploration programs further refined the plan; however, they did not change the original TARP concept. They were conducted only to optimize overall system effectiveness. Presently, TARP will enable collection of runoff water resulting from all but three of the severest rainfall storms recorded during the past 21 years.

3.3 TARP TUNNEL SYSTEMS

The four tunnel systems that are a part of the Tunnel and Reservoir Plan are the Mainstream, Calumet, Lower Des Plaines, and O'Hare systems. Each system is a completely independent operating unit with collection, storage, conveyance, and treatment capabilities. Figure III-1 shows the present routes and layout of these systems relative to the MSDGC combined-sewer service area, the MSDGC overall service area, and Cook County. Each of the TARP systems shown in the figure consists of three component systems: reservoirs, conveyance tunnels, and sewage treatment plants. A total of three reservoirs, 120 miles of conveyance tunnels, and four sewage treatment plants are included in the plan.

The TARP systems have two basic features which play a major role in solving the flood and pollution problems. First, the combined storage capacity of the plan is almost 136,800 ac-ft of which 127,600 ac-ft of the total is reservoir capacity and 9,200 ac-ft is tunnel capacity. The planned treatment capacity of TARP will be approximately 2,240 MGD. Second, over 640 existing overflow points will be eliminated within the MSDGC combined-sewer service area by the TARP systems.

3.5 59TH-TO-ADDISON TUNNEL SEGMENT

The Mainstream system of TARP consists of: two waste treatment plants with a total capacity of approximately 1,800 MGD; over 57 miles of conveyance tunnel with a storage volume of 3,180 ac-ft; and one main storage reservoir with a maximum capacity of 84,000 ac-ft. The component subsystems associated with the Mainstream system include 134 drop shafts; over 220 collecting structures; and one pumping station located at the main storage reservoir. The system and its component subsystems will be constructed in two phases. In Phase I, approximately 40 miles of tunnel will be constructed, and in Phase II, the remaining 17 miles will be constructed. The Phase II tunnel route is almost parallel to the 59th-to-Addison segment of the Phase I tunnel, as shown in Figure III-1, and it will be used as a relief tunnel.

Phase I construction has already commenced on the North Shore Channel segment from Addison Street to Wilmette Harbor. These segments, therefore, are not addressed in the Mainstream EIS. This EIS addresses the Phase I, 59th Street to Addison Street segment of the Mainstream system and focuses only on the conveyance tunnel system. The overall length of this tunnel segment is approximately 21 miles. The subsystems associated with it include 82 drop shafts, 5 construction shafts, 2 access shafts, 170 collecting structures, and 1 main pumping station.

3.6 COST OF TUNNEL SYSTEM AND SUBSYSTEMS

The MSDGC estimated cost[1] of a 10-foot diameter tunnel in rock with nominal aquifer protection is $200[2] per lineal foot. In rock with high quality aquifer protection, the cost is $230. Tunnel cost for soft ground construction is $350. Similarly, for a 35-foot diameter tunnel, the estimated costs are $1,030, $1,090, and $1,680 per lineal foot, respectively.

Large rectangular tunnels adjacent to construction shafts will be excavated by the drill and blast method and the estimated cost with nominal aquifer protection is $2,090 per lineal foot

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[1] MSDGC, January 1975.

[2] All cost figures presented in this section are based on 1972 values.

for a 30-foot diameter tunnel. The same type and size of tunnels with high quality aquifer protection would cost an estimated $2,170 per lineal foot.

The tunnel costs estimated above include the following base figures:

- Cost of muck disposal, estimated to be $4.00 per solid cubic yard
- Nominal grouting[1] for control of infiltration during construction, estimated to be $0.30 per square foot of tunnel wall
- Access and ventilation shaft construction
- Ventilation and hoist equipment
- Grout and grout inspection equipment
- Average aquifer protection costs.

Additional grouting for aquifer protection in unlined tunnel segments in the upper aquifers is estimated to cost $1.50 per square foot of tunnel wall. This grouting would be provided to a depth of about one tunnel diameter beyond the excavated tunnel limit.

The total construction cost for all the TARP tunnel systems is approximately $567 million. The estimated total costs for the subsystems are: $93 million for collecting/connecting structures, and $38 million for pumping stations. These subsystem costs are based on the following:

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[1] Grouting is a procedure whereby a mixture of cement and water is injected under pressure into a drilled hole that intersects a source of seepage such as an open joint, fault, or bedding plane.

Table III-2
Financing Schedule - Phase I Tunnel System and Other Non-TARP Elements of the MSDGC Pollution Control Plan

Priority List of Projects	Estimated Costs[1]	EPA			STATE OF ILLINOIS			MSDGC			COE		
		Currently Available[2]	Currently Projected[3]	Additionally Required[4]	Currently Available[5]	Currently Projected	Additionally Required	Currently Available[6]	Currently Projected[7]	Additionally Required	Currently Available[8]	Currently Projected[9]	Additionally Required
1. Conveyance Tunnels	1,032.4	372.6[10]	220.0	0.0	300.0	0.0	0.0	66.3	73.5	0.0	0.0	0.0	0.0
2. Instream Aeration	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0
3. Treatment Plant Upgrading[11]	1,019.1	0.0	560.0	166.2	0.0	0.0	0.0	0.0	0.0-254.8	0.0-166.6[1]	0.0	0.0	0.0
a) Calumet	352.8	0.0	264.6	0.0	0.0	0.0	0.0	0.0	88.2	0.0	0.0	0.0	0.0
b) West-Southwest	666.3	0.0	181.2	166.2	0.0	0.0	0.0	0.0	0.0-166.6	0.0-166.6	0.0	0.0	0.0
4. Reservoirs and Flood Control	810.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	810.1
Total[12]	2878.3	372.6	780.0	166.2	300.0	0.0	0.0	66.3	90.2-345.0	0.0-166.6[1]	0.0	0.0	810.1

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existing state and MSDGC funding sources. It is very unlikely, however, that the financing will be available to increase the treatment levels, efficiencies, and capacities at all the treatment plants (Northside, Calumet, and West-Southwest). The total required financing ($1.02 billion) would necessitate a significant increase above the additional levels of Federal ($780 million) and MSDGC ($200-400 million) funds expected to be available over the FY 1977-1986 timeframe. The financing feasibility of the Calumet treatment plant expansions, however, is reasonable in view of their combined total estimated costs of $352.8 million. The Federal funding portion ($264.6 million) could be provided from the additional $780 million PL 92-500 appropriation expected over the next six years. The MSDGC portion ($88.2 million) could be provided from the anticipated $200-400 million additional bonding authorization.[1] In terms of the West-Southwest treatment plant expansion project (estimated cost of $666.3 million), the financing feasibility is very questionable in view of the requirement for additional funds beyond the levels (Federal and MSDGC) expected to be available over the period FY 1977 to 1986.

The operation and maintenance costs of the TARP tunnel systems will be financed by a user charge system rather than the current ad valorem tax system. PL 92-500 requires the development of a user charge system and the State of Illinois presently has the authority to impose a user charge. This system of financing the annual operations and maintenance costs of the tunnel systems is not expected to have a significant economic impact in the commercial, industrial, and household sectors. The incremental charge in the MSDGC tax rate per $100 of assessed valuation (1975 rate was $.4005) is estimated to be $.0541 (for operations and maintenance) and $.0532 (for tunnel construction) by the year 1986. The

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[1] However, to provide the $126.3 million, the MSDGC's additional bonding authorization must be at least $216.5 million.

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(1) Effects of Operation on Water Quality

THE TUNNEL WILL SIGNIFICANTLY REDUCE THE POLLUTANT LOAD CURRENTLY DISCHARGED TO CHICAGO'S WATERWAYS, HOWEVER, THE TUNNELS ALONE WILL NOT RESULT IN ATTAINING APPLICABLE ILLINOIS WATER QUALITY STANDARDS, AND, THEREFORE, WILL NOT ENABLE ADDITIONAL USES OF THE AFFECTED WATERWAYS. THE ATTAINMENT OF ILLINOIS WATER QUALITY STANDARDS DEPENDS ON ADDITIONAL CONTROL MEASURES FOR WHICH THE FUNDING PROSPECTS ARE NOW POOR.

This conclusions is based on the following findings:

- The tunnels will capture approximately 90 percent of the pollutant load now discharged during combined-sewer overflows and will reduce the pollutant load 75 percent overall and the frequency of overflows from 100 to 10 times per year. 1977 Illinois water quality standards will continue to be violated during overflow events because of uncontrolled injections of pollutants into the waterways.

- The tunnels may not result in the attainment of 1977 Illinois standards for ammonia over lengthy reaches of waterway, because high concentrations of this pollutant are discharged from local wastewater treatment plants. Although data is not presently available to allow a more definitive determination of effects on this point, the attainment of water quality standards in the area's major river systems is clearly and intimately tied to the upgrading and expansion of MSDGC treatment plants.

- With the tunnels on line, 1977 Illinois standards of 4 mg/l for dissolved oxygen (DO) will still be violated along approximately 50 of the 80 miles of the Main Channel and of the Calumet River systems during the critical late summer months. Conditions along the Des Plaines River system have not yet been modeled by the MSDGC, but will be completed under the Section 208 planning program.

Table IV-1
Impact of Potential Pollution Control Options on Water Quality Along Main Channel and Calumet River Systems[1]

Notes (a) Tunnels plus instream aeration effects addressed in Section 8.1.1 of EIS.
(b) Phasing of options shown in order adopted by MSDGC in modeling studies.

Water Quality Component \ Pollution Control Option	No Action	Phase I Tunnels	Phase I Tunnels Plus Instream Aeration	Tunnels Plus Treatment Plant Upgrading[2] Plus Instream Aeration	Tunnels Plus Reservoirs Plus Treatment Plant Upgrading Plus Instream Aeration
Combined-Sewer Overflows	Overflow to waterways 100 times per year. Illinois standards violated most of the time.	Overflows reduced from 100 to 10 per year. 75 percent of pollutant load captured and treated.	No significant change	No significant change	No significant change
Ammonia and Phosphorus Levels	Ammonia standard violated by treatment plant discharges; phosphorus standard violated during overflow.	Ammonia and (possibly) phosphorus standards violated due to treatment plant discharges.	No significant change	Ammonia and phosphorus standards met most of the time (not during overflow episodes).	Ammonia levels in waterways improved beyond standard, phosphorus standard met.
Dissolved Oxygen (DO) Concentrations[3]	DO levels below Illinois standards along 80 percent of waterways. Anaerobic conditions exist over large stretches.	DO levels below Illinois standards along 70 percent of waterway. Anaerobic conditions greatly relieved.	Resulting change in DO levels not known	Resulting change in DO levels not known	Illinois standard met over entire 80-mile length of waterway. Anerobic conditions completely eliminated.
Allowable Water Uses	Illinois water use standards not met along area waterways.	No significant change	No significant change	No significant change	Illinois water use standards met. Fishing, boating, and shoreline activities permitted.

[1] Computer simulations of water quality along the Des Plaines River not yet available.

[2] Upgrading to tertiary level assumed with nitrogen and phosphorus removal.

[3] Evaluated for dry weather flow conditions.

[4] Computer simulations of dry weather flow conditions.

- Analysis of the geologic and seismic characteristics of the project area indicates that most of the area is stable and suitable for the construction of underground tunnels. Precautionary measures will be required to protect workers in segments where rockfall and partings (loosened material) may occur frequently and shale deterioration conditions prevail.

Further information on this subject may be found in Sections 6.2.2 and 7.1.2.

(8) Effects of Operation on Land Use

THE QUALITY OF LAND IN CERTAIN RIVERBANK SECTIONS ALONG THE 59TH-TO-ADDISON MAINSTREAM TUNNEL ROUTE MAY BE ENHANCED BY REDUCED FLOODING CONDITIONS.

Vacant land exists between the North Branch-Chicago River and North Leavitt Street (bounded by West Oakdale Avenue on the north and North Hoyne Avenue on the south) in a residential area. The reduction of flooding in this area may enable development of this under-utilized land into open space uses such as: parks, playgrounds, sport fields, and parking areas.

(9) Effects of Construction on Employment

CONSTRUCTION OF THE MAINSTREAM TUNNEL WILL PROVIDE OVER $87 MILLION IN CONSTRUCTION INCOME OVER A SEVEN-YEAR PERIOD AND WILL CREATE A PEAK SUPPLY OF APPROXIMATELY 800 JOBS OVER A THREE-YEAR PERIOD.

Further information may be found in Section 7.1.3.

(10) Funding Uncertainty for TARP

THE CONVEYANCE TUNNELS CAN BE FINANCED BETWEEN 1976-1987 WITH MODEST INCREASES IN ANTICIPATED FEDERAL AND LOCAL FUNDING. HOWEVER, THE FUNDING OF THE RESERVOIR DURING THIS TIME PERIOD IS NOT A PART OF THE CURRENT FINANCING PLAN AND COULD NOT BE ACCOMPLISHED WITHOUT HAVING A MAJOR FINANCIAL IMPACT ON THE STATE, CITY, OR MSDGC.

Additional details on this finding may be found in Section 3.3.1 of the EIS.

(11) Effects of Flooding on Lake Michigan

THE FLOODING PROBLEM EXISTING IN THE CHICAGO AREA WILL NOT BE RESOLVED BY THE PHASE I TUNNELS. OVERFLOW TO LAKE MICHIGAN WILL STILL PERSIST IF THE PROPOSED RESERVOIRS ARE NOT IMPLEMENTED.

V. CONCLUSIONS AND RECOMMENDATIONS

The following is a summary of the principle conclusions of the Final EIS, as well as recommended and suggested mitigative measures.

1. Implementation of the Mainstream Tunnel system will significantly reduce the pollutant load in the Chicago waterways. These loadings will be reduced further with the implementation of the Calumet and lower Des Plaines Tunnel systems. Water quality will be enhanced further with the upgrading of MSDGC's treatment facilities and the construction of the flood control aspects of the Tunnel and Reservoir Plan.

2. Significant earthquake events could adversely affect tunnel alignment and tunnel lining. Smaller earth movements could also affect the lining and grouting of the tunnels. It is, therefore, essential that MSDGC's inspection and maintenance program be extensive enough to insure efficient operation of the system.

3. Rock falls and partings may occur particularly in shale formations during construction. Stabilizing measures such as rock bolting are proposed to mitigate the short-term construction problems, while concrete lining will be utilized for the long term. Even with these measures, shale deterioration will continue and the inspection program should take these sensitive areas into account.

4. The rock spoil excavated from the Phase I tunnels is not expected to be marketable. Evaluation of various disposal alternatives leads to the conclusion that adequate environmentally acceptable landfill sites are available to handle the volume of rock which will be generated by the Phase I tunnels under consideration. We will rely on existing local, state, and Federal regulations to insure that disposal takes place in an acceptable manner. Additionally the MSDGC will be required to inform USEPA of their spoil disposal program as it is developed through discussion with the Contractor. This will be a condition of any grant awarded to the MSDGC for the Mainstream Tunnel System.

5. Although an effective grouting program is proposed, it must be sufficiently flexible to respond to the actual conditions encountered during construction. Should the grouting not be sufficient, additional infiltration could adversely affect the hydraulic pressure of the upper aquifer.

Additionally, under surcharged conditions, exfiltration will occur, resulting in adverse impacts on the groundwater quality of the upper aquifer. Observation wells to monitor grouting integrity during operation are necessary along the entire tunnel alignment. An adequate number of wells are already in existence for the Mainstream Tunnel system. If pollutants are detected in the observation wells, additional mitigative measures must be implemented to protect the upper aquifer, including a groundwater recharge system. Chapter X discussed particular aspects of the monitoring program, which will be developed in conjunction with the MSDGC, IEPA and USEPA. This monitoring program will also be a grant condition.

6. Since the majority of the construction shafts and drop shafts are in close proximity to area waterways, runoff from these sites could adversely affect water quality. Berms will be constructed around stockpiles of construction materials and spoil materials to preclude runoff into the waterways.

7. It is presently proposed that water pumped from the tunnels during construction be discharged directly to the waterways after a period of settling. Since the possibility of silt and other pollutants still exists after settling, it is recommended that these dewatering flows be discharged to MSDGC's intercepting system for treatment, except during periods of combined sewer overflows. This will be a condition of any grant awarded for the Mainstream Tunnel System.

8. Although no known historic, architectural, or archaeological resources will be affected by the proposed project, the possibility of finding archaeological resources must be investigated by the MSDGC. This must be accomplished by contacting the State Historic Preservation Officer.

9. Conformance with applicable regulation of the Occupational Health and Safety Administration, U.S. Department of Labor, and the Bureau of Mines, U.S. Department of the Interior is essential for safety of construction workers.

10. A conflict exists between the location of several drop shafts and the plans for the Central Area Transit Project. The MSDGC must meet with the Chicago Urban Transportation District to resolve these conflicts.

11. There exists a wide range of potential adverse impacts which could develop during construction. This includes blasting, waste spillage, traffic congestion, light glare, and fugitive dust at construction and disposal sites. While these effects could be considered insignificant any measures taken to reduce their impact would aid in public acceptability of the project. These suggested mitigative measures are discussed in Chapter X.

Figure I-3. The Committee formed a technical advisory committee to develop the plan and to solicit engineers and scientists from government agencies and private consulting firms to assist in the study. Fifty-one alternative solutions were identified to meet water quality standards, to reduce flooding conditions, and to prevent backflows to Lake Michigan. These alternative solutions were analyzed to compare their capital costs, annual maintenance and operation costs, benefits, land acquisition and underground easement requirements, and requirements for relocating residential, commercial, and industrial developments.

The Flood Control Coordinating Committee members evaluated the alternative plans in detail and selected TARP as less costly and more environmentally acceptable than the other plans they evaluated. They initiated additional studies to develop and refine TARP. In October 1972, the final TARP plan was presented at a public meeting conducted by the MSDGC to obtain community and citizen reaction. The following year the MSDGC conducted a public meeting (July 26, 1973) to discuss TARP environmental issues and assessments. Many hearings conducted by Government and local agencies have been held on TARP. A few of the recent hearings include:

- The U.S. Army Corps of Engineers' hearing on the entire tunnel and reservoir plan (November 1975)
- The State of Illinois EPA hearing on the design grants for the first phase tunnels (September 1975)
- The MSDGC hearing concerning the EPA construction grants for the Wilmette-to-Addison segment of TARP's Mainstream system (July 1975)
- The Northern Illinois Planning Commission's (NIPC) hearing on the TARP facility plans (April 1974).

1.6 OBJECTIVES AND DESCRIPTION OF THE PLAN

The primary objective of TARP is to improve surface water quality within the planning area. The plan is designed to meet water quality standards set forth in the "Water Pollution Regulations of Illinois."[1] These regulatory standards were established for three surface water-use classifications: (1) General (primary body contact), (2) Public and Food Processing (drinking water), and (3) Secondary Body Contact and

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[1] Issued by the Illinois Pollution Control Board (IPCB) on January 31, 1974 (amended).

Engineers, and the State of Illinois EPA for review and evaluation. The U.S. EPA review focused on all the pollution control aspects of TARP, while the Corps of Engineers review[1] included the water management aspects of the entire Chicago area. The Illinois EPA review, however, focused on the design aspects of the Phase I tunnels only.

In accordance with U.S. EPA procedures for determining whether an environmental impact statement is necessary, the environmental review was performed on the proposed TARP systems and subsystems based on the information presented by the MSDGC. The review did not indicate that any significant environmental impacts would result from the Addison-to-Wilmette segment of the Mainstream system. Consequently, a decision not to prepare an EIS was made for this segment. This action was taken on the basis of a careful review of the facilities plan, as well as of the environmental assessment report and of other supporting data. However, EPA review of the other tunnel system segments (Mainstream, Calumet, Lower Des Plaines, and O'Hare - Des Plaines did indicate the possibility of significant environmental impacts. The EPA then determined that the preparation of an environmental impact statement will be necessary for these tunnel segments.

1.8 SCOPE OF THE TARP EIS

The EIS for the MSDGC's Tunnel and Reservoir Plan addresses the environmental issues relevant to the conveyance tunnels and their component subsystems. These tunnels and associated subsystems are a part of the four TARP systems identified in the previous section. The purpose of the EIS is to assess the positive and negative impacts of TARP on the physical, biological, and socioeconomic environment; flood control systems are not included in the EIS. The Mainstream Tunnel system EIS includes only the Phase I tunnel and not the relief tunnel, which will be used for flood control purposes. Likewise, no proposed storage reservoirs are included, since their primary purpose is flood control.

The environmental impacts associated with each TARP system will be presented in a separate statement and will focus on the conveyance tunnels only. This EIS has been prepared for the Mainstream Tunnel System from 59th Street to Addison Street, in accordance with the regulations and guidance set forth in the President's Council on Environmental Quality (CEQ) Guidelines (August 1, 1973), and the

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[1] The U.S. Army Corps of Engineers is presently preparing an overall EIS for the water management aspects of the Chicago area.

commerce, transportation, recreation, and sanitation. This section describes the status of Chicago area water resources prior to the implementation of TARP. The discussion of groundwater and surface water supply addresses the following topics:

- Quality, availability, and uses of water resources
- Pollution sources
- Resource management programs
- Flood prone areas.

2.1.1 Surface Water

The surface waterways of the Chicago area constitute an interconnected network of rivers and canals whose natural flow into Lake Michigan has been reversed by a series of locks. The major surface waterways under study are the Chicago River - Sanitary and Ship Canal System, the Calumet River System, the Des Plaines River System, Lake Calumet, and Lake Michigan. The remainder of this section describes the quality and availability of surface water supplies, the regulation of surface water flow, the potable water supplies, and the deposition of sludge in the three water systems. These systems are depicted in Figure II-1 along with water use classifications which were established by the State of Illinois EPA.

The Chicago River System includes:

- North Shore Channel from Lake Michigan at Wilmette
- North Branch of the Chicago River from the confluence of West Fork and the Skokie River downstream to the Chicago River
- Chicago River flowing westward from the Chicago River Controlling Works at Lake Michigan to the junction with the North and the South Branches of the Chicago River
- Tributaries to the North Branch of the Chicago River as they cross the Lake-Cook County line.

The Chicago Sanitary and Ship Canal System includes the South Branch of the Chicago River from the junction with the North Branch, the Chicago River, and the Sanitary and Ship Canal downstream to the Lockport Lock and Dam.

FIGURE II-1
Chicago Area Waterways and
State Water Use
Classifications

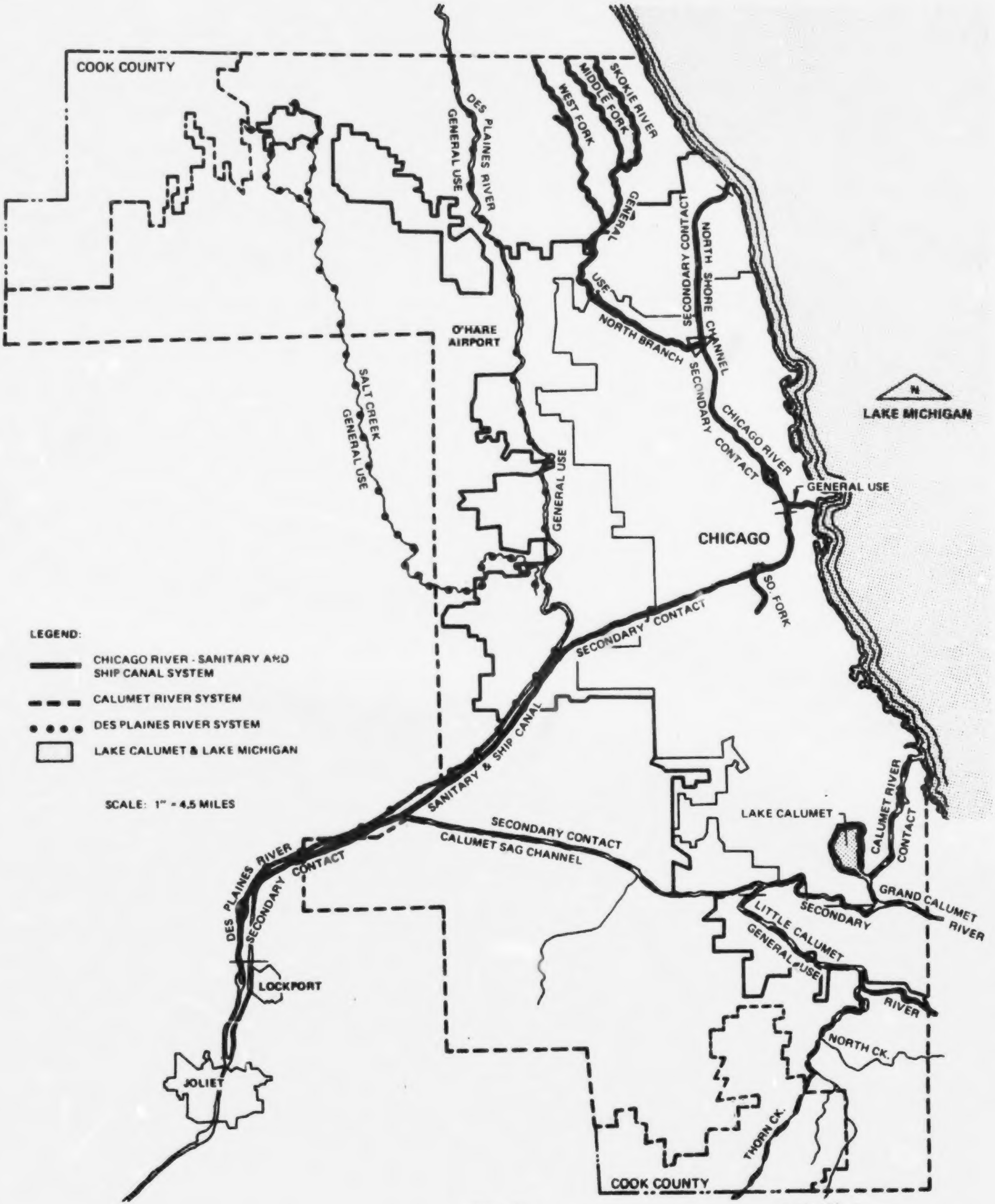

COOK COUNTY
DES PLAINES RIVER
GENERAL USE
WEST FORK
MIDDLE FORK
SKOKIE RIVER
GENERAL
USE
SECONDARY CONTACT
NORTH SHORE CHANNEL
NORTH BRANCH
SECONDARY CONTACT
CHICAGO RIVER
N
LAKE MICHIGAN
GENERAL USE
O'HARE AIRPORT
SALT CREEK
GENERAL USE
GENERAL USE
CHICAGO
SO. FORK
SECONDARY CONTACT
LEGEND:
CHICAGO RIVER - SANITARY AND SHIP CANAL SYSTEM
CALUMET RIVER SYSTEM
DES PLAINES RIVER SYSTEM
LAKE CALUMET & LAKE MICHIGAN
SCALE: 1" = 4.5 MILES
SANITARY & SHIP CANAL
LAKE CALUMET
CALUMET RIVER
CONTACT
SECONDARY CONTACT
CALUMET SAG CHANNEL
DES PLAINES RIVER
SECONDARY
CONTACT
GRAND CALUMET
RIVER
SECONDARY
LITTLE CALUMET
GENERAL USE
RIVER
LOCKPORT
NORTH CK.
JOLIET
THORN CK.
COOK COUNTY

Table II-2
Summary of Pollutant Concentration Ranges in Chicago's Surface Water Systems

Pollutant	Chicago River — Sanitary and Ship Canal System	Calumet River System	Des Plaines River System	Applicable Illinois Standards*	
				Secondary Contact	General Use
Dissolved oxygen (DO)	1.2 to 7.7 mg/l	3.9 to 9.0 mg/l	6.0 to 10 mg/l	5.0 mg/l[1] 4.0 mg/l (1978)[2] 3.0 mg/l 4.0 mg/l min.[1] 2.0 mg/l min.	6.0 mg/l 5.0 mg/l min.[3]
Biochemical oxygen demand (BOD)	5.2 to 9.2 mg/l	4.1 to 7.3 mg/l	5.0 to 6.7 mg/l	4-20 mg/l[4]	4-20 mg/l[4]
Ammonia (as N)	0.8 to 6.2 mg/l	1.3 to 13 mg/l	0.3 to 1.2 mg/l	4.0 mg/l (winter) 2.5 mg/l (summer)	2.6 mg/l[3]
Suspended solids (SS)	19 to 54 mg/l	12 to 73 mg/l	29 to 68 mg/l	5-25 mg/l[5]	5-25 mg/l[5]
Fecal coliform	477 to 12,700 (counts/100 ml)	152 to 738 (counts/100 ml)	411 to 8,700 (counts/100 ml)	1000/100 ml[1]	200/100 ml[2]

* Effluent discharge standards apply if water quality standard is not designated.

[1] North Shore Channel Standards

[2] Chicago River-Sanitary and Ship Canal System and Calumet River system.

[3] General Use Standard applicable to Des Plaines River system.

[4] 4 mg/l-Hanover, Egan, and O'Hare Sewage Treatment Plants
10 mg/l-WSW and Calumet Sewage Treatment Plant
20 mg/l-Lemont Sewage Treatment Plant

[5] 5mg/l-Hanover, Egan, and O'Hare STP
12mg/l-WSW and Calumet STP
25mg/l-Lemont STP

Table II-3[1]

Minimum Federal Standards for Selected Water Uses[a]

	General Recreational[b]	Designated Recreational[c]	Primary Contact[d]	Growth of Freshwater Organisms
Fecal Coliform				
Mean	2,000/100 ml	1,000/100 ml	200/100 ml	-
Maximum	4,000/100 ml	2,000/100 ml	400/100 ml	-
pH				
Normal Range			6.5-8.3	-
Absolute Range			5.0-9.0	6.0-9.0
Dissolved Oxygen				
Coldwater Biota				
Mean				7.0 mg/l
Spawning Mean				6.0 mg/l
Normal Mean				4.0 mg/l
Warm Water Biota				
Mean				5.0 mg/l
Minimum				4.0 mg/l
Total Dissolved Solids				
Maximum			1,500 mg/l	

[a] These are suggested standards.

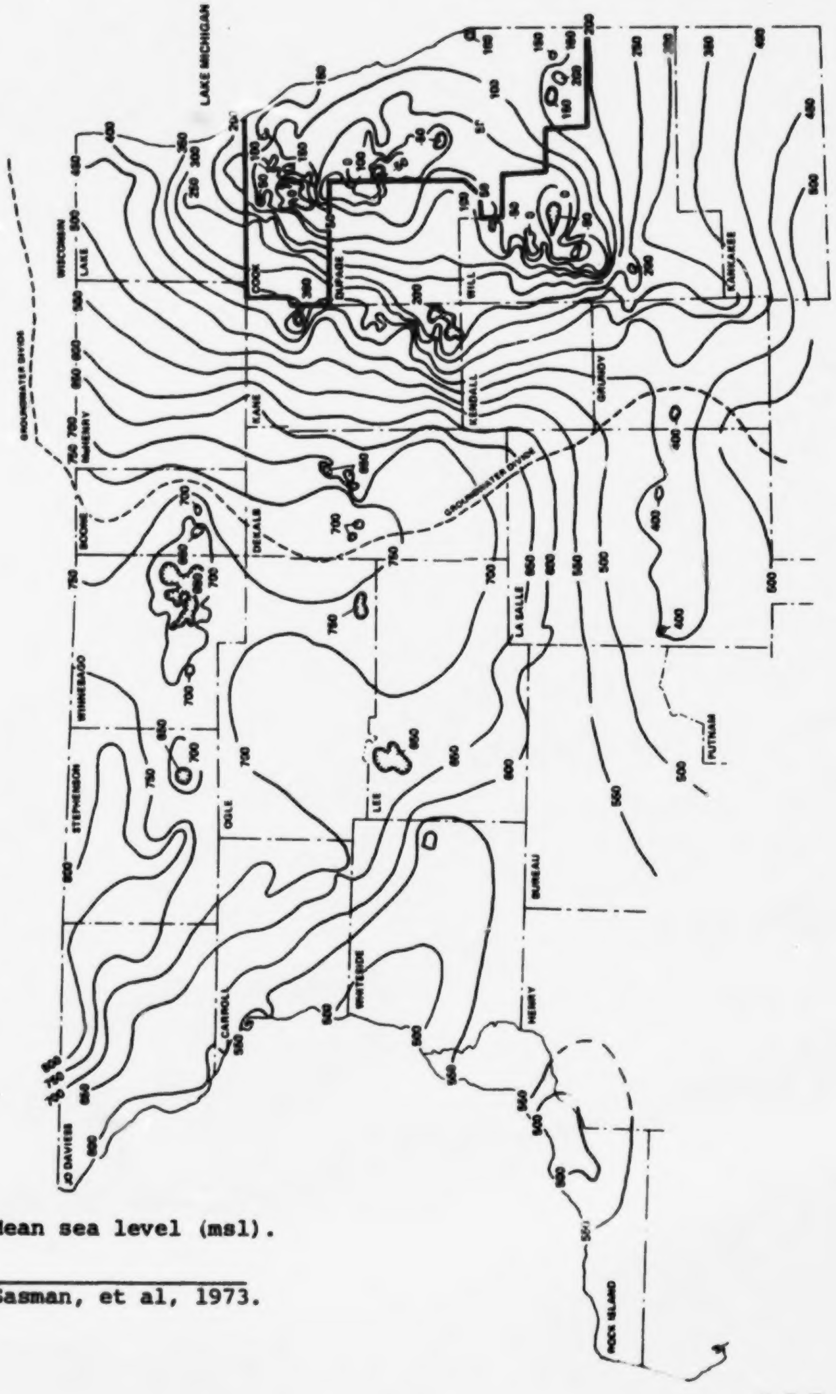
[b] General recreational use areas are those areas suitable for human use in recreation activities not involving significant risks of ingestion without reference to official designation of recreation as a water use.

[c] Designated recreational use areas are those areas suitable for recreational activities not involving significant risks of ingestion and officially designated as a recreation area.

[d] Primary contact use areas are those areas suitable for human use in recreation activities involving significant risks of ingestion.

[1] Federal Water Pollution Control Administration, U.S. Department of Interior, Water Quality Criteria: Report of the National Technical Advisory Committee, April 1, 1968, Washington, D.C. (U.S. EPA expects to publish later this year a set of guidelines to replace this report.)

FIGURE II-6
Elevation* of Piezometric Surface of Lower (Cambrian-Ordovician) Aquifer in October 1971[1]


LAKE MICHIGAN
WISCONSIN
GROUNDWATER DIVIDE
LAKE
McHENRY
COOK
DUPAGE
WILL
KANKAKEE
KANE
KENDALL
GRUNDY
BOONE
DEKALB
LA SALLE
WINNEBAGO
OGLE
LEE
PUTNAM
STEPHENSON
BUREAU
JO DAVIESS
CARROLL
WHITESIDE
HENRY
ROCK ISLAND
GROUNDWATER DIVIDE

* Mean sea level (msl).

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1 Sasman, et al, 1973.

including the receiving stream, the average flow for 1973, and the average influent and effluent concentrations of BOD, SS, and ammonia nitrogen are presented in Table II-8.

The largest treatment plants; West-Southwest, Northside and Calumet, provide preliminary, primary and secondary treatment using chlorination and post-aeration. Hanover, Lemont and Streamwood provide preliminary, primary, secondary and tertiary treatment using chlorination and post-aeration. The John E. Egan plant, presently nearing operation, will also provide tertiary treatment.

Both BOD and SS concentrations easily meet the Federal guidelines of 30 mg/l (roughly equivalent to 30 ppm) for each. Although more stringent Illinois discharge standards for BOD, SS and ammonia nitrogen (see Table II-8) do not have to be met until December 31, 1977, most of the MSDGC plants are already in compliance with the BOD and SS standards, 10 mg/l and 12 mg/l, respectively, and two plants better the ammonia nitrogen standard.

(2) Industrial Waste Loads

Industrial waste flows sent to MSDGC treatment plants total about 195 MGD or equivalent to 4.5 million people and is distributed as follows: 135 MGD to the West-Southwest facility, 22 MGD to the Northside facility, and 38 MGD to the Calumet plant. In addition there are other industrial and privately-owned treatment plants which discharges in the area as shown in Figure A-2 of Appendix A. Discharges from these sources are subject to the MSDGC Sewage and Waste Control Ordinance and must meet the State of Illinois effluent discharge standards shown in Table II-1.

(3) Combined Sewer Overflows

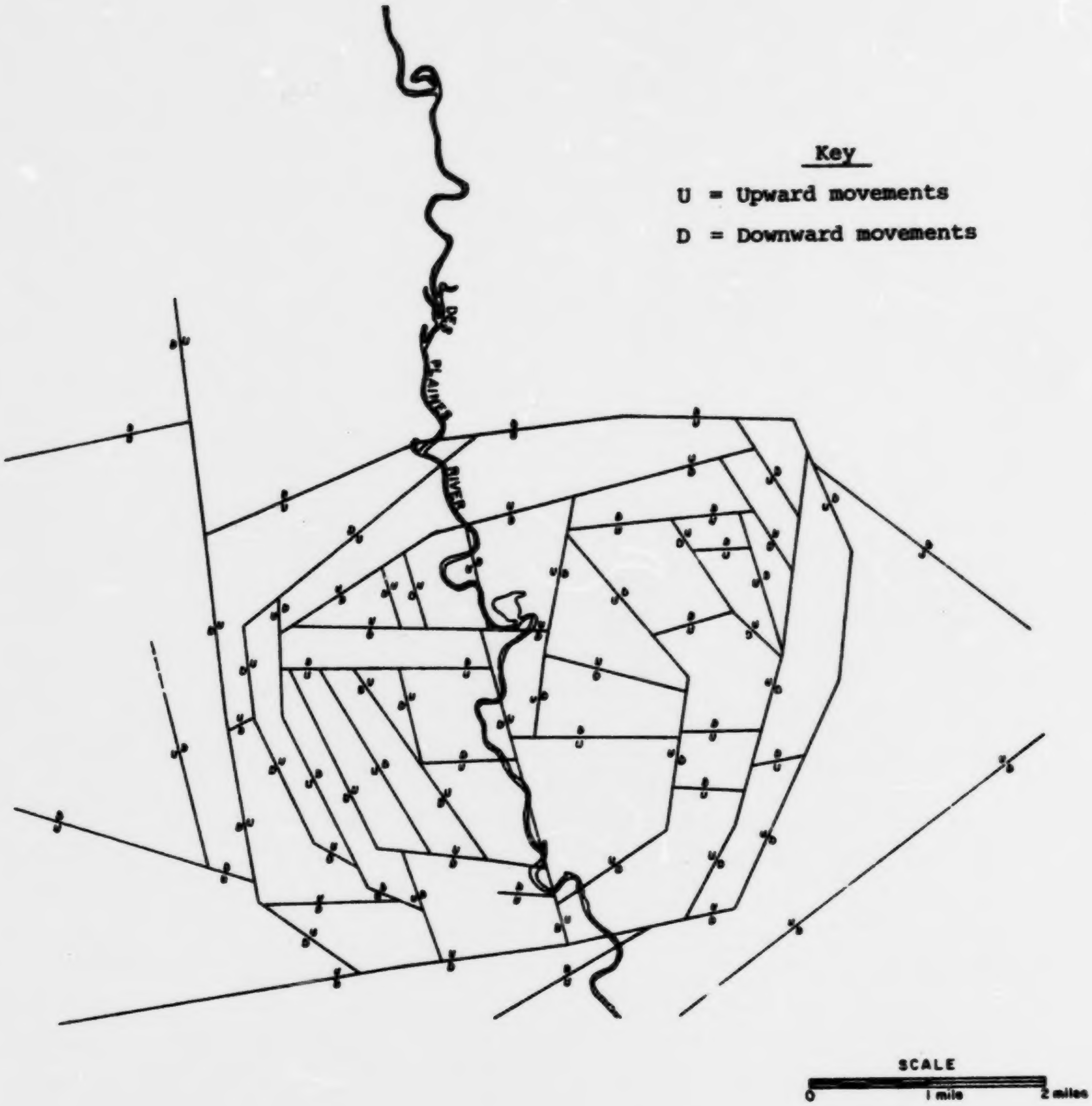
Chicago area waterways are subject to increased pollutant inputs from the combined sewers during periods of overflow. Rainfall runoff in excess of about 0.1 inches leads to discharge of raw sewage and runoff at about 645 outfalls in the area. Such events occur approximately 100 times per year, injecting BOD, SS, grease, pathogenic organisms and other pollutants into the waterways in large quantities. During such events minimum Illinois standards for restricted use waters are not met.

FIGURE II-28
Complex Faulting
Des Plaines Disturbance[1]

Key

U = Upward movements

D = Downward movements


DES PLAINES RIVER
U
D
SCALE
0
1 mile
2 miles

112<

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[1] HEC, 1972.

3.2.6 Recreational Sites

Along the proposed tunnel route, the existing recreational sites are the borders of the Chicago River in the central business district. These areas are used for recreational walking, sightseeing, fine arts exhibits, and other cultural exhibitions.

The Riveredge Plan would provide for increased river-oriented open space; small parks, public properties, and pedestrian facilities along the 1.5-mile bank of the Chicago River between Lake Michigan and Wolf Point.

Other sites could be developed along the South Branch if water quality and flood control projects, such as the TARP project, were executed. Less flood danger combined with redevelopment such as the proposed riverfront improvements of the South Loop New Town Plan would make recreational use possible for existing unutilized or underutilized land.

3.3 RESOURCES

The following two sections discuss financial and labor resources. The first section provides ar analysis of the financial resources available to fund the Mainstream Tunnel System and the other two tunnel systems, and the second section presents a profile of the labor force in the Chicago metropolitan area.

3.3.1 Financial

This section discusses the financing schedule and availability of pollution control funds for:

- The MSDGC's Flood and Pollution Control Program
- The Mainstream Tunnel system (water pollution control tunnels only)
- The total Phase I Tunnels (water pollution control tunnels only).

In addition, this section addressess the availability of funds for certain elements of the MSDGC's Flood and Pollution Control Plan, which are not part of Phase I tunnels and are essential to the overall goal of meeting the 1983 water quality standards. These elements include:

- Instream aeration
- TARP storage reservoirs
- Increases in treatment levels, efficiencies, and plant capacities.

Both existing and potential funding sources are considered for the pollution control aspects of the program and for the key elements which are not part of Phase I Tunnels to assess how much financial assistance current programs might provide and to indicate how these programs must be augmented to complete program implementation. The impact of Phase I Tunnels MSDGC's property tax rate is also considered, and the annual sequence of anticipated contract award dollars is identified for the construction of the Phase I Tunnel projects. The fund commitment schedule is also presented, indicating anticipated sources necessary for the support of this award program. The data and analyses presented in this section indicate that the financing requirements of constructing the Phase I Tunnels of TARP can be met. In addition, it can be reasonably assumed that the financing requirements of other key elements of the MSDGC's Flood and Pollution Control Plan associated with meeting 1983 water quality standards (instream aeration and expansion of the Calumet treatment facilities) can be met. In the case of the West-Southwest treatment plant expansion project, Step 2 financing has already been granted. Finally, financing for the TARP storage reservoirs is nonexistent. The complex issue of the authority of the Corps of Engineers in the case of urban drainage improvement projects is currently under consideration. However, there is presently no congressional appropriation and no request from the U.S. Army Corps of Engineers for an appropriation to help support the construction of the TARP reservoirs.

(1) Construction Cost Schedule

The total Chicago Flood and Pollution Control Program has two major parts; TARP, to correct the combined-sewer overflow problem, and a series of projects identified by the MSDGC. Major goals of thes series of projects include:

Table III-11
Construction Award Schedule for the Mainstream Tunnel System and the Phase I Tunnels*

Construction Contracts	Fiscal Year										
	76	77	78	79	80	81	82	83	84	85	86	Totals
Addison to Wilmette	11.6	15.4	15.4	15.4	15.4	15.2	7.7					96.1
59th to Central	2.2	8.8	8.8	8.8	8.8	3.1						41.4
Central to Damen	2.8	11.0	11.0	11.0	11.0	11.0	3.2	1.4				62.4
Damen to Roosevelt		7.8	9.5	9.5	9.5	9.5	7.2	2.2	2.2	0.1		57.5
Roosevelt to Ogden		2.6	10.6	10.6	10.6	7.3	1.4	1.4	0.1			44.6
Ogden to Addison		6.2	7.5	7.5	7.4	7.4	4.7	1.3	1.3			43.3
North Branch Chicago River			1.5	5.7	5.7	5.7	5.7	5.8	1.8	1.6		33.5
Pumping Station			4.1	8.2	8.2	8.2	5.7					34.4
Mainstream Tunnel System	**											
No Cost Escalator	16.6	51.8	68.4	76.7	76.6	67.4	36.5	12.1	5.4	1.7		413.2
Six Percent Annual Cost Escalator	16.6	54.9	76.9	91.4	96.7	90.2	51.8	18.2	8.6	2.9		508.2
Total Phase I Tunnels	***											
Six Percent Cost Escalator	50.7	92.2	159.8	183.5	189.9	173.0	95.7	57.5	22.2	5.7	2.2	1,032.4

* The figures (in $millions) represent the construction costs of the mainstream tunnels, drop shafts, connecting structures, and drop shaft grouting.

** Figures are derived from data provided by the Office of the Technical Project Officer (MSDGC TARP Project), Region V EPA.

*** Figures are based on data supplied by MSDGC in January 1976.

$508.2 million. Approximately 84 percent ($87.0 million in 1975 dollars) of the collecting structure and drop shaft costs have been determined by EPA to be eligible for construction grant funds under the Federal Water Pollution Control Act Amendment of 1972 (PL 92-500).[1] The other 16 percent is associated with flood control benefits and is, therefore, ineligible for pollution control funding. The last line of the table represents the construction cost schedule for all of the tunnel systems (Mainstream, Calumet, and Des Plaines systems). The estimated construction cost of all of the tunnels (in 1975 dollars, escalated six percent annually) is $1.0322 billion. The annual operating and maintenance costs for the Mainstream Tunnel system are estimated to be approximately $2.3 million; the estimate for the entire tunnel system is $13 million annually.

(2) Sources of Funds

Certain funds are either already available or may be requested under existing legislation for implementing a part of the total Flood and Pollution Control Plan. These funds are derived from local, State, and Federal sources. The Federal sources include grant programs involving water pollution control, flood control, urban renewal, and recreation facilities development. This section focuses on the sources of pollution control funds for implementing the Mainstream Tunnel system.

1. Metropolitan Sanitary District of Greater Chicago (MSDGC)

The MSDGC customarily finances construction and facilities replacement by proceeds from the sale of construction bonds. The District is authorized to incur indebtedness in an amount not to exceed five percent of its total assessed valuation. As of January 1, 1976, the unexercised debt-incurring capacity is $718.5 million.

Prior to 1971, the plan to issue bonds required a referendum. In 1971, however, a bill was enacted authorizing the issuance of up to $380 million in general obligation construction bonds without referendum. The MSDGC can issue these bonds at a maximum rate of $100 million per year, plus carry-over of the unused portion of that rate

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[1] The figure of 84 percent may not hold for the other two tunnel systems. Certain costs for the Calumet and Lower Des Plaines systems are still under review with no final conclusions derived to date.

Table III-12
1976 Estimate of the Change in Property Tax Rate Attributable to the Implementation of the Phase I Tunnel System

Fiscal Year	Cost of Tunnel Plan ($Millions)	Incremental Change in Tax Rate ¢/$100 Assessed Valuation	Cumulative Change in Tax Rate ¢/$100 Assessed Valuation
76	50.7	.005	.005
77	92.2	.007	.012
78	159.8	.013	.025
79	183.5	.013	.038
80	189.9	.012	.049
81	173.0	.021	.070
82	95.7	(.004)	.066
83	57.5	(.005)	.061
84	22.2	(.002)	.059
85	5.7	(.003)	.056
86	2.2	(.003)	.053

Assumptions:

- MSDGC's share of construction costs is 25 percent
- MSDGC financing is accomplished with 20-year bonds, 5 1/2 percent coupon
- TAX BASE ($22.7 billion in 1975) is escalated at six percent annually
- Operating/maintenance cost not included in Tunnel Plan cost figures
- Effect of construction grant program disbursement schedule on MSDGC is not considered.

1 This represents a 13.3 percent increase over the 1975 MSDGC tax rate of $.4005 per $100 of assessed valuation

(3) Phase I Tunnels Financing Schedule - Currently Available and Additionally Required Funds

To complete the Phase I Tunnels, the financing schedule must coincide with the design and construction schedules. Table III-13 presents the award schedules anticipated for Mainstream Tunnel system, total Phase I Tunnels, and the total Flood and Pollution Control plan. The table also depicts the financing schedule necessary to support the implementation of the Phase I Tunnels. This same schedule can be used to assess the financing feasibility of the Mainstream Tunnel system.

The table shows that the existing available funding from the Federal Government, the State, and the MSDGC is sufficient to implement the Mainstream Tunnel System. Additional Federal Water Pollution Control funds of approximately $220.0 million and MSDGC funds of approximately $73.5 million will be required to meet the implementation schedule for the total Phase I Tunnels. In view of the sound fiscal posture of the MSDGC, the high priority assigned TARP by the state, and the very conservative estimates of future Federal appropriations, it can be reasonably assumed that the future financing requirements can be met.

(4) Financing of Maintenance and Operations Costs

For maintenance and operations, the District is authorized to levy an *ad valorem* tax in an amount not to exceed $.37 for each $100 of assessed valuation, less the amount received pursuant to the Industrial Waste Surcharge Ordinance. The State statute also contains authority to impose a user charge which is currently required under PL 92-500.

Despite the fact that many municipalities historically have funded operation and maintenance costs of treatment facilities by imposing *ad valorem* taxes, this system does not provide incentives for domestic and low-volume commercial users to conserve water. EPA headquarters has contended, however, that "a properly formulated user charge system based on *ad valorem* taxes is a viable and appropriate method of funding operation and maintenance costs."[1] Region V EPA has

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[1] Letter from EPA Administrator Russell E. Train to House Speaker Carl Albert, February 3, 1975.

Table III-13
Financing Schedule - Phase I Tunnel System and Mainstream Tunnel System

Fiscal Year	Awards Schedule ($Millions)			Fiscal Year	Funding Sources ($Millions)					
					Federal (EPA)		State		MSDGC	
	Total Flood Control and Water Pollution Control Plan (1)	Phase I Tunnel Systems	Mainstream Tunnel System (2)		Existing	Additional** Requirement for Phase I Tunnel	Existing	Additional** Requirement for Phase I Tunnel	Existing	Additional** Requirement for Phase I Plan
76	379.4	50.7	16.6	76	372.6*	-	300	-	66.3	-
77	493.4	92.2	54.9	77		-		-		-
78	512.1	159.8	76.9	78	-	-	-	-	-	-
79	665.7	183.5	91.4	79	-	-	-	-	-	-
80	617.2	189.9	96.7	80	-	-	-	-	-	-
81	457.3	173.0	90.2	81	-	83.4	-	-	-	27.8
82	231.6	95.7	51.8	82	-	71.8	-	-	-	23.9
83	110.7	57.5	18.2	83	-	43.1	-	-	-	14.4
84	55.6	22.2	8.6	84	-	16.7	-	-	-	5.5
85	9.6	5.7	2.9	85	-	4.3	-	-	-	1.4
86	3.9	2.2	-	86	-	1.7	-	-	-	.5
Total	3,536.5	1,033.4	508.2		372.6	221.0	300	-	66.3	73.5

* Includes approximately $49.6 million already obligated to the North Shore section of Mainstream TARP (Addison-Wilmette segment).

** Assumes required financing will be forthcoming; 75 percent from Federal and state sources and 25 percent from the MSDGC.

(1) Estimated costs based on values and construction phasing schedule presented in MSDGC's "Facilities Planning Study," January 1975.

(2) Estimated costs based on values presented in MSDGC's "Environmental Assessment Statement for Mainstream Tunnel System," January 1975.

1[illegible]9<

awarded two grants to the MSDGC to develop a user charge system to comply with the requirements to PL 92-500. The final system will probably be based on water usage (as opposed to ad valorem taxes) with several categories of user charge schedules.

(5) Major Elements Not Related to the Phase I Tunnel Plan Currently Available and Additionally Required Funds

This section addresses the financing schedule and availability of funds for certain elements of the MSDGC's Flood and Pollution Control Plan, which are not part of the Tunnel and Reservoir Plan and are closely associated with the overall goal of meeting 1983 water quality standards. These elements include:

- Instream aeration to add dissolved oxygen to the waterway system receiving plant effluents
- Increases in treatment levels, efficiencies, and plant capacity
- Excavation of three TARP storage reservoirs to provide for capture of remaining pollutant discharges to reduce backflows to Lake Michigan and to provide for flood control.

1. Instream Aeration

In terms of project phasing and priorities, instream aeration stands ahead of the Tunnel Plan (tunnel systems, drop shafts, and connecting structures).[1] Instream aeration is not a treatment system and is thus not eligible for FWPCS funding. The Illinois EPA, however, has committed funds for the instream aeration phase of the project. The funding requirement (approximately $16.7 million for a series of eleven batteries of diffusers located adjacent to and parallel to the banks of the waterway) will most likely be met from the $300 million of State funds targeted for the MSDGC or from funds raised by the District through an anticipated increased or additional bonding authorization.

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[1] MSDGC Facilities Planning Study, January 1975, p. M-XI-14.

Funding of instream aeration with the currently available State funds would increase the additional funds required by the MSDGC to implement the Tunnel Plan, from $73.5 million to $90.2 million (see Table III-13). In view of the sound fiscal posture of the MSDGC, it can reasonably be assumed that the future financing requirements can be met.

2. Treatment Plant Improvements

Treatment plant improvements (North-Side, Calumet, West-Southwest plants) require an estimated $1.02 billion. Construction of the O'Hare treatment plant is planned for the near future; the project entails an estimated cost of $124 million, of which EPA has obligated $93 million in Step 3 FWPCA funding, and the MSDGC is funding the remainder.

In terms of priorities, the treatment plant expansion at Calumet (estimated cost of $352.8 million) stand directly behind instream aeration.[1] According to current estimates, this project will be ready for Step 3 FWPCA funding in January of 1979. The West-Southwest treatment plant expansion project (estimated cost of $666.3 million) is currently expected to be ready for Step 3 FWPCA funding in December 1979.[2]

Focusing on the higher priority Calumet expansion project, it is anticipated that sufficient FWPCA and MSDGC funds will be available to finance the proposed project. As discussed in a previous section of this report, the MSDGC can reasonably expect $780 million of additional FWPCA funds over the FY 1977-1982 period. An estimated $220.0 million

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[1] MSDGC Facilities Planning Study, January 1975, p. M-XI-14.

[2] The cost estimates for the three treatment plant projects are based on the estimates provided in the MSDGC's Facility Plan (January, 1975). These estimates were in 1975 dollars and had to be escalated for the assumed 6 percent annual inflation rate.

(see Table III-13) of this total is required for implementation of the Phase I Tunnel system. The remaining $560 million of Federal funds would more than cover the required $264.6 million (75 percent of $352.8 million) for the Calumet treatment plant expansion projects. The MSDGC's share of the project ($88.2 million) will increase the District's additional funding requirement from $90.2 million (additional funds required for the Tunnel Plan and instream aeration) to $178.4 million. In view of the MSDGC's AA general obligation bond rating and its current formulation of plans to ask Illinois for an increased or additional bonding authority in the vicinity of $200-400 million, it is reasonable to expect that the Calumet treatment plant expansion project can be financed.

For the West-Southwest treatment plant expansion project, the financing feasibility cannot be defined at this time. According to current estimates, this project will not be ready for Step 3 FWPCA funding until December 1979. The remaining portion of the $780 million of FWPCA funds estimated to be available to the MSDGC for the period FY 1977-1982, would fall short by approximately $166.2 million, if it were obligated to the West-Southwest treatment plant expansion project.[1] In addition, the funding of this project would increase the MSDGC's additional funding requirement from $178.4 million to $345 million. The projected shortfall in Federal funds and the significant increase in MSDGC funds required combine to make the funding feasibility highly doubtful for the West-Southwest treatment plant expansion project.

3. Reservoirs

The estimated cost of the three TARP storage reservoirs (Upper Des Plaines, Mainstream, and Calumet systems) is $471.6 million in 1975 dollars.[2]

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[1] EPA's portion of this project would be approximately $499.7 million; the MSDGC's portion would be $166.6 million.

[2] Addition of the flood control tunnels raises this figure to approximately $.81 billion in 1975 dollars escalated 6 percent annually.

The benefits derived from the construction of the reservoirs primarily are control of overbank flooding and decrease of flood discharges into the downstream reaches of the waterways. EPA headquarters has, therefore, determined that the reservoirs appear to be ineligible for FWPCA funding.

The reservoirs, however, could potentially qualify for Federal flood control funding. The Flood Control Act of 1937 established the principle of Federal participation in flood control projects. The 1944 Flood Control Act redefined flood control to include channel and major drainage improvement. In practice, however, this authority (drainage improvement) has only been applied to the agricultural area. There is no precedent for Federal participation (drainage improvement) in urban applications such as the TARP reservoirs.

The Corps of Engineers is now in the process of determining the Federal interest in providing funding for the total Underflow Plan. The Chicago District Corps of Engineers has prepared a report entitled Urban Water Damage Study, The Chicagoland Underflow Plan, dated December 1975. Final recommendations regarding the division of Underflow Plan responsibilities depend on the character and degree of interest at EPA headquarters. The Chicago District has sent the report to the North Central Division office of the Corps of Engineers which will, in turn, be sent to the office of the Chief of Engineers.

Table IV-1
Alternative Plan Comparison Matrix

ALTERNATIVE PLANS	MOD 2								MOD 3								MOD 4*							
	Capital Costs (1972) (10⁶ dollars)	Equiv. Annual Costs (1972) (10⁶ dollars)	Equiv. Annual Tangible Benefits (10⁶ dollars)	Benefit - Cost Ratio **	Land Acquisition (Acres)	Underground Easement (Acres)	Resident and Business Relocations	Overall Environmental Impacts	Capital Costs (1972) (10⁶ dollars)	Equiv. Annual Costs (1972) (10⁶ dollars)	Equiv. Annual Tangible Benefits (10⁶ dollars)	Benefit - Cost Ratio **	Land Acquisition (Acres)	Underground Easement (Acres)	Resident and Business Relocations	Overall Environmental Impacts	Capital Costs (1972) (10⁶ dollars)	Equiv. Annual Costs (1972) (10⁶ dollars)	Equiv. Annual Tangible Benefits (10⁶ dollars)	Benefit - Cost Ratio **	Land Acquisition (Acres)	Underground Easement (Acres)	Resident and Business Relocations	Overall Environmental Impacts
A***	2815	239	47	0.56	400	2000	Low	(See parts (4) and (5) of Section 4.2.2)	1621	148	46	0.57	300	300	Low	(See parts (4) and (5) of Section 4.2.2)	1804	150	57	0.77	0	1000	Low	(See parts (4) and (5) of Section 4.2.2)
Ap	3137	223	47	0.60	2000	3200	Med.		1957	139	44	0.61	1100	1900	Med.		—	—	—	—	—	—	—	
B	2211	194	47	0.69	600	1600	Low		1360	129	46	0.66	400	300	Low		1533	129	57	0.89	0	1000	Low	
Bp	2523	182	47	0.73	1800	3400	Med.		1637	120	44	0.71	1200	2000	Med.		—	—	—	—	—	—	—	
C	2183	193	47	0.69	1100	1800	High		1380	129	46	0.66	400	700	Low		1484	124	57	0.93	0	1000	Low	
Cp	2491	179	47	0.74	2000	3600	High		1676	121	44	0.70	1400	2100	High		—	—	—	—	—	—	—	
D	2680	243	43	0.55	5000	0	High		1589	159	44	0.54	3600	0	High		1532	146	57	0.79	2500	0	High	
E	2071	183	47	0.73	800	1600	Med.		1401	129	46	0.66	500	500	Med.		1470	122	57	0.94	100	1000	Med.	
F	3615	294	47	0.45	1600	0	Low		1834	156	44	0.55	1100	0	Low		1530	124	57	0.93	[illegible]	0	Low	
G	1923	162	47	0.82	600	0	Low		1002	90	44	0.94	400	0	Low		1377	115	57	1.00	200	0	Low	
H	1557	137	47	0.97	800	0	Low		912	85	44	1.00	400	0	Low		1356	115	57	1.00	400	0	Low	
J	1554	138	47	0.96	600	0	Low		921	86	44	0.99	400	0	Low		1366	116	57	0.99	400	0	Low	
Q	1551	138	47	0.96	1300	400	High		1014	97	44	0.88	500	500	Med.		1367	118	57	0.97	400	200	Med.	
Qp	1583	133	47	1.00	700	700	High		1070	93	44	0.91	500	400	High		—	—	—	—	—	—	—	
R	1580	149	47	0.89	800	300	Med.		1040	103	46	0.82	500	100	Med.		1363	120	57	0.96	200	300	Med.	
Rp	1894	157	47	0.85	900	1200	High		1195	103	44	0.82	600	700	High		—	—	—	—	—	—	—	
S	1843	157	17	0.85	800	0	Med.		979	89	44	0.95	500	0	Med.		1346	115	57	1.00	200	0	Med.	

* Considered not economically feasible for Alternative Ap, Bp, Cp, Qp, and Rp.

** A policy decision was made to control flooding and waterway pollution in the Chicago metropolitan area. Since this public policy has been established, the assumption is that the least cost plan for fulfilling the policy is justified and that the benefits of the project to the public are equal to the least costly alternative in each MOD. The benefit-cost ratio, therefore, was calculated based on this assumption.

*** FCCC designations.

Sludge volume: 1,005 dt/d
Planning period: 25 years
Total cost: $280,480,900
Annual costs:
Capital: $ 1,290,100/year
M&O: $20,391,200/year
Total: $21,681,300/year

4.3.3 Spoil Material

For the ten-year construction period, excavation of the Phase I TARP tunnels will produce a solid measure of approximately 11,747,000 cubic yards (roughly 26 million tons) of earth and rock that must be disposed of in an environmentally acceptable fashion. For comparison purposes, the total solid measure of spoil produced by the construction of TARP (including reservoirs) is 183 million cubic yards. Peak spoil production from tunnel excavation is expected to be approximately 2.2 million cubic yards (4.9 million tons) at the midpoint of the ten-year construction period. Construction of the Mainstream Tunnel from 59th Street to Addison Street will account for approximately 3,027,000 cubic yards (solid volume) of spoil material (-6,743,000 tons) including excavation of the pumping station at 59th Street. The duration of constructing this segment is approximately 6.5 years. MSDGC has indicated that disposal of the excavated spoil material will be the responsibility of the construction contractor for each tunnel section. Since each contractor's proposed disposal plan and criteria will not be identified until the preconstruction meetings with the MSDGC, we present here only those alternatives most likely to be implemented by the contractors. These disposal options are:

- Sale of spoil to quarry operators
- Throw-away to operating quarries
- Disposal in defunct quarries
- Sale to other parties.

These alternatives will be discussed briefly in the following sections:

(1) Sale of Spoil to Quarry Operators

Direct sale of the marketable portion of excavated material to the operators of area quarries may be an alternative method for disposing of a small portion of the tunnel rock. The large portion of the excavated material will be low grade rock spoil usable only as select fill for such uses as road base material and site grading. Although such applications are not typical of the uses of materials currently extracted from area quarries, quarry operators may be receptive to marketing the low grade material.

V. DESCRIPTION OF THE PROPOSED ACTION

5.1 THE SELECTED PLAN

TARP was selected among all alternatives as the most feasible plan to solve the flooding and pollution problems of Chicago. The plan is a composite of several alternatives (G, H, J, and S) modified to provide optimum benefits for the lowest cost and minimum adverse environmental impacts. TARP was first described in the FCCC's report of August 1972. Refinements were incorporated as field studies and subsurface exploration programs were completed. The studies and programs, however, did not change the original TARP concept, but only incorporated design revisions to optimize overall system effectiveness.

Essential to full utilization of the design capacity of TARP and, therefore, to the realization of maximum benefits of TARP is the full participation of the combined-sewer communities that are tributary to TARP. This participation means not only connecting excess overflows to TARP but also upgrading combined-sewer systems to transport flows from a five-year storm to TARP connecting structures, a condition assumed in the design of TARP and in subsequent analyses of ultimate water quality benefits.

TARP was developed to enable collection of storm runoff from urban communities within the MSDGC's combined-sewer service area. The polluted runoff water will be diverted and conveyed to storage reservoirs. When favorable dry weather conditions prevail, the wastewater will be pumped from the reservoirs into conveyance tunnels and transported to appropriate sewage treatment facilities. Based on rainfall records of the past 21 years, the plan is designed to have the capability of handling runoff volumes equivalent to all except three of the severest storms recorded.

The four systems that are part of the Tunnel and Reservoir Plan are: Mainstream, Calumet, Lower Des Plaines, and O'Hare, which are described in the following sections. Each system is a completely independent operating unit with collection, storage, conveyance, and treatment capabilities. Although this chapter summarizes the entire TARP, the objective of this EIS is to assess the effects of those tunneling portions of the plan directly related to water pollution

5.1.1 TARP Systems

Each of the TARP systems (Mainstream, Calumet, Lower Des Plaines, and O'Hare) consists of three component systems: reservoirs, conveyance tunnels, and sewage treatment plants. For the TARP project as a whole, the planned component systems include three storage reservoirs, approximately 120 miles of conveyance tunnels, and four sewage treatment plants. McCook, the main storage reservoir, will have a capacity of about 84,000 ac-ft and will be located at McCook quarry, which is adjacent to the Sanitary and Ship Canal and the Des Plaines River. One of the other two reservoirs, will be located near the northwest boundary of O'Hare International Airport and the other approximately six miles south of the existing Calumet Sewage Treatment Works. The O'Hare reservoir will be a small surface storage reservoir with a capacity of 2,700 ac-ft and Thornton Quarry, the Calumet reservoir will have a much larger storage volume of about 40,900 ac-ft.

The conveyance tunnels, located 150 to 290 feet below ground level, will be constructed under existing waterways or public rights-of-way, and within, for most of the route, the silurian limestone (dolomite) geologic formation. Mining machines or "moles" will be used to excavate most of the tunnels, which presently range from 10 to 30 feet in diameter.[1] The tunnels will be concrete-lined as required in certain areas. The lining thickness will range from 7 to 23 inches, based on one-half inch per foot of tunnel diameter and two additional inches. For the entire 120-mile length, the total wastewater capacity of the conveyance tunnels is approximately 9,200 ac-ft.

The combined-sewer wastewater collected in the tunnels (and later the reservoirs) of the three TARP systems, O'Hare, Calumet, and Mainstream are transported to their respective treatment plants, O'Hare, Calumet, and West-Southwest, for complete treatment. Capacity equal to approximately 0.5 average dry weather flow of each plant will be available during dry weather for continuous treatment of TARP flows, as summarized below (the plant capacities are future design, not existing capacities):

	Nominal ADWF, MGD	Available for TARP, MGD
West-Southwest	1358	679
Calumet	354	177
O'Hare	72	36
	1784	892

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[1] The diameter expressed is an equivalent diameter, since tunnels will be somewhat oval-shaped and not a true circle.

control. For the purposes of the impact analysis, this statement describes and evaluates the conveyance tunnel system and its subsystems only. Figure V-1 shows the present routes and layout of the TARP systems relative to the MSDGC combined-sewer service area, the MSDGC overall service area, and Cook County.

The over 57 miles of conveyance tunnel will be constructed in two phases. Phase I involves construction of about 40 miles of tunnel which will be the main wastewater conveyance system. The remaining 17 miles will be constructed in Phase II, almost parallel to the lower portion of the main line route, to be used primarily as a relief system. The Mainstream conveyance tunnel will have 134 drop shafts and a storage volume of approximately 3,180 ac-ft.

The one treatment plant associated with the Mainstream System are the West-Southwest Sewage Treatment Works. The West-Southwest plant will have a planned-capacity of 1,358 MGD and will process all wastewaters from both the Mainstream system to the Lower Des Plaines system.

The combined-sewer overflow conveyed by the system's tunnels may be stored in the proposed Mainstream system reservoir which may also store overflow wastewater conveyed by the Lower Des Plaines system. The storage capacity planned for this reservoir is 84,000 ac-ft, the projected wastewater inflow from both of these systems can be stored for periods up to nine months. Aeration systems will be installed in the main storage reservoir to control odor and septicity if storage must exceed the three day limit.

The portion of the Mainstream system addressed by this environmental impact statement is described in detail in the following sections; Component System and Component Subsystems. The component system is the Mainstream conveyance tunnel only, not including reservoirs and waste treatment plants. In addition, the tunnel route to be addressed is the 59th Street to Addison Street segment, excluding the North Branch of the Chicago River, Addison Street to Wilmette, and the relief tunnel segments of the Mainstream system. The subsystems described are associated with the conveyance tunnel and include drop shafts, collecting structures, and pumping stations.

5.2.1 Component System

The total area served by the Mainstream conveyance tunnel system from 59th Street to Addison Street is 152.5 square miles, within the MSDGC "Central Facility Area." The 59th-to-Addison service area is presently served by local combined-sewer systems, and 124.2 of the total square

No. of Shafts	Finished Diameter	Type
2	17'	DW4
4	13'	DW4
4	12'	DW4
4	9'	EM15
1	7'2"	EM15
2	5'8"	EM15
4	4'	EM15
1	2'	EM15

Total: 22

Figure V-3 shows the location of the 22 drop shafts along the conveyance tunnel route and Table V-1 summarizes the number, locations and sizes of the shafts.

The main pumping station for this segment of the tunnel system will be constructed underground adjacent to the 59th Street construction shaft, which is at the downstream end of the conveyance tunnel route. Four pumps will be installed approximately 40 feet below the tunnel bottom elevation and each pump will have a rated capacity of 265 cfs or about 170 MGD. For removing any infiltrated groundwater from the tunnel, a 5,000-GPM capacity pump will be installed at the station.

The 59th-to-Damen tunnel will consist of 45 collecting structures intercepting the combined-sewer overflows. Thirty-three drop shafts will intercept the overflow points directly, 2 drop shafts will collect overflows from new adjacent interceptors, and the remaining 10 will collect overflows from existing interceptors. The structures for the 10 existing interceptor connections will consist of conduits of sufficient size to allow the full capacity of the existing sewer to flow to the interceptor without any overflow surface water systems. Therefore, the existing interceptors will be relieved at 10 points.

(2) Damen Avenue to Addison Street Tunnel

The Damen-to-Addison segment will have 62 drop shafts constructed to intercept the overflows and convey them to the tunnels. The finished diameters of these drop shafts vary from 4 feet to 17 feet. The numbers and sizes are as follows:

No. of Shafts	Finished Diameter	Type
3	17'	DW4
5	13'	DW4
6	12'	DW4
11	9'	EM15
10	7'2"	EM15
6	5'8"	EM15
21	4'	EM15

Total: 62

The location of the shafts along this segment of the Mainstream route is shown in Figure V-4. A summary of drop shafts is presented in Table V-2.

This portion of the tunnel system will not have a separate pumping station. All wastewater overflows will be conveyed by gravity to the main or 59th Street pumping station.

The tunnel segment design includes a total of 125 collecting structures intercepting the combined-sewer overflows. Fifty-three of these drop shafts will intercept overflows directly, 9 will collect flows from existing interceptors nearby, and 63 will collect flows directly from existing interceptors. All existing overflow collectors will be maintained to enable relief of the combined-sewer system when the tunnels become filled.

To eliminate direct overflow discharge to waterways, 70 existing combined sewers will be connected directly to the interceptors, providing conduits of sufficient size to allow maximum flow to the interceptors in the event existing sewer lines are filled to capacity. Therefore, 63 interceptor relief points are provided for the existing interceptors.

130<

High dewatering rates are necessary to achieve velocies of tunnel water which will scour sediment from the tunnel floor. When dewatering time is increased, removal of sediment is increased as well. To remove more sediment, the operator would increase dewatering time from about four and one-half hours to eight hours by directing about 240 cfs of canal water to a drop shaft upstream of the pumping station. The operator would pump this canal water to the WSWSTW.

During dry weather periods, only infiltrating water from aquifers will flow into the tunnel. To rid the tunnel of this water, the pumping station operator will use a separate pump with a capacity of about 5,000 gpm to lift the water to the treatment system. This dewatering of infiltrating groundwater could probably be made automatic if necessary. To perform the dewatering manually, the operator must shut the pump off when there is not enough water to warrant its use as well as shut it off in wet weather when the main dewatering pumps are in use.

A routinely required step that is critical to the system is checking and testing the power sources to the pumps. Lack of power during wet weather could result in polluting overflows at interceptor collection points, drop shafts, and outfalls.

5.3.2 Maintenance Steps

Required maintenance of the system comprises four areas:

(1) Equipment Maintenance

Pumps, pump controls, and power supply equipment routinely must be checked and maintained.

(2) Repair to Tunnel Lining

Those areas of the tunnels which are lined, bolted, grouted, or otherwise stabilized, will require periodic checking for leaks and structural faults, and periodic repairing as necessary.

the average annual dollar volume is significant in comparison with several of the major budget appropriations. In terms of tax rate effect, however, the funding of are Phase I Tunnels will increase the construction portion of the MSDGC tax rate from $.118/$100 of assessed valuation to only approximately $.171/$100 in 1986.[1] This increase is relatively small in comparison to the overall city of Chicago rate ($8.557/$100 assessed valuation) and other tax rate figures such as:

	Tax Per $100 Assessed Value
Board of Education	$3.47
City General Fund (fire, police, health, etc.)	$2.929
Chicago Park District	$ .774
Junior College Funding	$ .268
County Government Services	$ .65
Forest Preserve District	$ .096

In summary, it does not appear that the MSDGC's portion of the Phase I Tunnels funding would cause any significant reallocation of resources at the local level.

(2) State of Illinois

At the State level, the alternative use of the $300 million currently targeted for the Phase I Tunnels is the funding of the MSDGC instream aeration project and the expansion of the Calumet and West-Southwest Treatment facilities. These funds, however, would be obligated later than the FY 1976-77 time frame because the development of detailed plans for these facilities will not be completed until FY 1979 and, therefore, the proposed facilities will not be eligible for construction funding until FY 1979-80, according to recent

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[1] In FY 1975, the MSDGC's tax rate was 40.05¢/$100 of assessed valuation (25.23¢/$100 for operations and maintenance; 11.75¢/$100 for construction bonds). The 5.32¢/$100 increase in the tax rate due to the Tunnel Plan was depicted in Table III-12.

estimates supplied by the MSDGC. The non-MSDGC alternative uses for the state funds include some 400 projects (approved by EPA for FWPCA funding) on the Illinois prioritized list of some 1,173 water pollution control projects. It must be emphasized, however, that traditionally half of the State of Illinois funds have been allocated to the MSDGC. The current portion of funds (available from the state) targeted for MSDGC for the Phase I Tunnels will not cause any significant or discernible disallocation of resources.

(3) Federal

At the Federal level, the question of alternative uses of the FWPCA funds targeted for the Phase I Tunnels is more complex and has very serious ramifications. If the Tunnel Plan is not implemented, there is a very high probability that approximately 90 percent of the current $323.6 million targeted for the MSDGC will be lost by the District and by the State of Illinois as well.

The potential loss to the MSDGC stems from the fact that the Calumet Treatment facility expansion project, while high enough in the priority list for FWPCA funds, will not meet the September 30, 1977 deadline for Step 3 funding eligibility. The Step 2 grants obligated in May and June of 1975, and the construction design and specifications necessary for Step 3 funding are currently scheduled to be completed in January of 1979.[1] Step 3 funding for this treatment facility is estimated at $261 million.[2] Assuming this project did not qualify in time for existing FWPCA funds, it is estimated that only approximately 10 percent of the $323.6 million could alternatively be allocated to other MSDGC prioritized pollution control projects.

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[1] Construction design and specifications required for Step 3 funding for the West-Southwest Treatment Facilities are scheduled to be completed December 1979.

[2] These funds would be employed specifically to provide treatment capacity to provide for nutrient removal by nitrification and to provide plant capacity for tertiary level of treatment by filtration.

7.6 COMMITMENT OF RESOURCES

Construction of the proposed project would require about 450,000 cubic yards of concrete and undetermined quantities of other construction materials. Construction vehicles and equipment, as well as vehicles used by construction workers would consume approximately 186,000 gallons of gasoline and 100,000 gallons of diesel fuel during project construction.

Electrical power needed for constructing the TARP conveyance tunnels will be purchased rather than generated on site. All underground construction activities will rely heavily on electricity for power generation, whereas surface construction will use predominantly internal combustion engines. Tunneling machines or moles will be the principal consumers of electrical power, and they will account for much of the energy used in this project. The amount of power which may be consumed during construction is expected to be less than one percent of total energy consumed in the region. The demand that this would place on the metropolitan power grid depends on the number of tunnels being constructed at the same time, and the extent of other construction operations that are underway. Each tunnel system is expected to consume a maximum of two to five megawatts of electrical power (MW_e). Assuming a worst case situation of all three tunnel systems being constructed at the same time and coal is used to generate a maximum amount of 15 megawatts (5 MW_e per system), approximately 70,000 tons of coal will be consumed during each year of construction. This estimate is based on a 8,500 Btu/lb heating value—20 percent ash coal resource. This construction rate represents approximately 0.06 percent of the total coal production rate for the Illinois, Indiana, western Kentucky, and Michigan region in 1969.[1]

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[1] "Potential Pollutants in Fossil Fuels," Esso Research and Engineering Company, Report prepared for the U.S. EPA, Office of Research and Monitoring, June 1973.

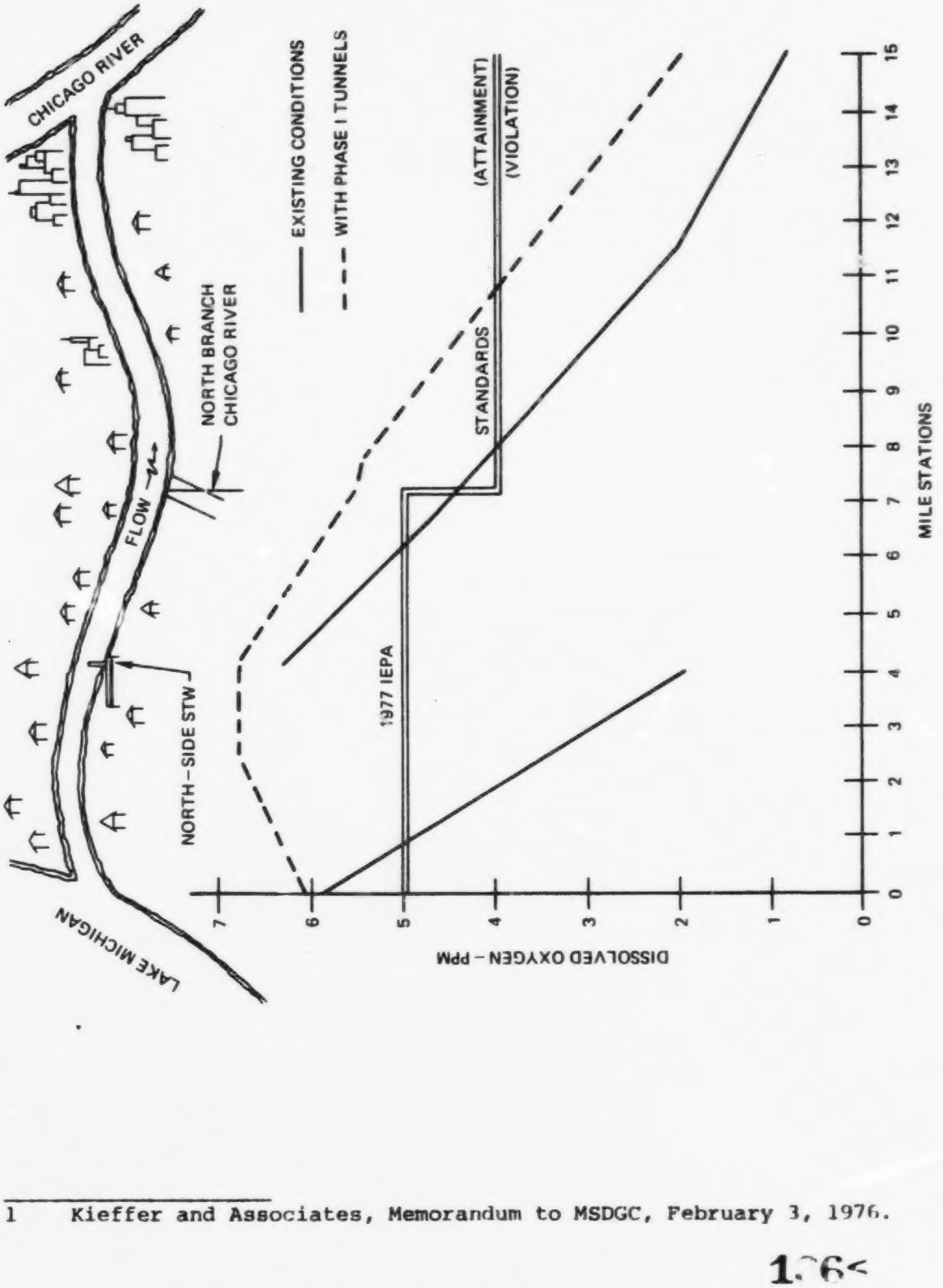
Chapter II discussion of existing water quality in terms of simulated DO concentrations along the length of the major waterways. That discussion is continued and updated here.

The upgrading of DO concentrations along area waterways as a result of tunnel operation is shown graphically in Figures VIII-1,2, and 3. These figures compare DO concentrations under existing dry weather flow conditions with concentrations expected with the Mainstream and Calumet Phase I tunnels on line. The Des Plaines River system has not yet been modeled on the computer because of insufficient data. This system, however, will be modeled in the Section 208 planning program. For these simulations, average 1974 treatment plant effluents were used, along with flows from Lake Michigan representing average lockages (Lake Michigan water used in lock operations) and leakages (lake water leaking through lock gates). The simulations of conditions with tunnels on line assume increased discharges from the West-Southwest and Calumet treatment plants to reflect the expected dewatering of the tunnel system in post-storm periods. In addition, the benthic oxygen demand (part of the total BOD) for the simulation of Phase I conditions was assumed to be reduced by 80 percent of that used for modeling existing conditions (see Part (5) below.) The assumptions used in the simulations are summarized in Table VIII-2.

In general, the simulations show that with the Phase I tunnels on line, an improvement in DO concentrations averaging about 1.7 mg/l above existing conditions can be expected over the approximately 80 miles of waterways modeled. However, as is evident from the figures, the 4 mg/l dissolved oxygen standards will not be met over 70 percent or about 60 miles, of the waterway during dry weather flow conditions (mostly during late summer months). This is in addition to those ten occasions during the year on which most standards will not be met because the combined-sewer overflows will exceed tunnel storage capacity, causing overflow to the waterways.

In addition, it is expected that Illinois restricted use standards will not be met under dry weather flow conditions without additional measures because of the quality of effluent from area treatment plants. Although detailed information is lacking, it appears that restricted use standards for ammonia are not likely to be met without upgrading of treatment facilities. Even though the tunnel system would intercept

FIGURE VIII-1
Simulation of Dissolved Oxygen Concentrations Along North Shore Channel and North Branch of the Chicago River[1]



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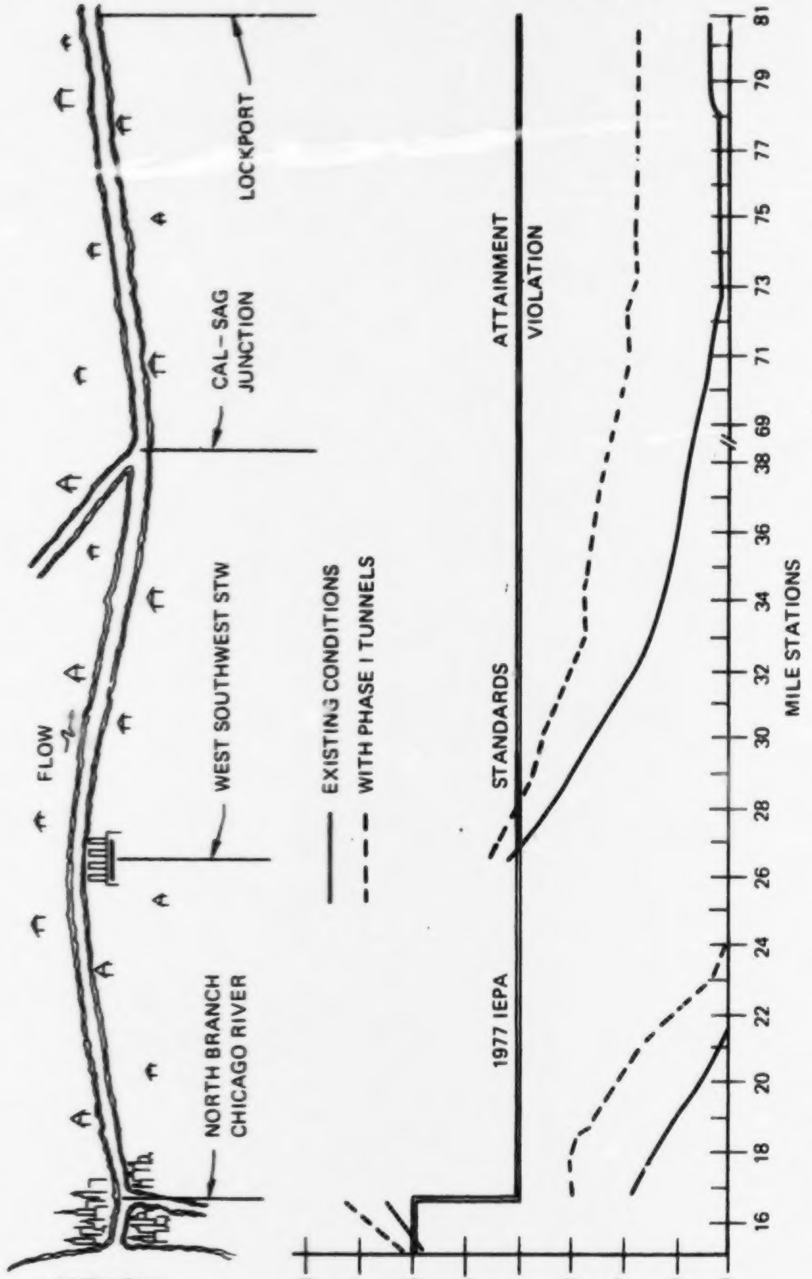
[1] Kieffer and Associates, Memorandum to MSDGC, February 3, 1976.

FIGURE VIII-2
Simulation of Dissolved Oxygen Concentrations Along the Main Chanrel From Lake Michigan to Lockport[1]



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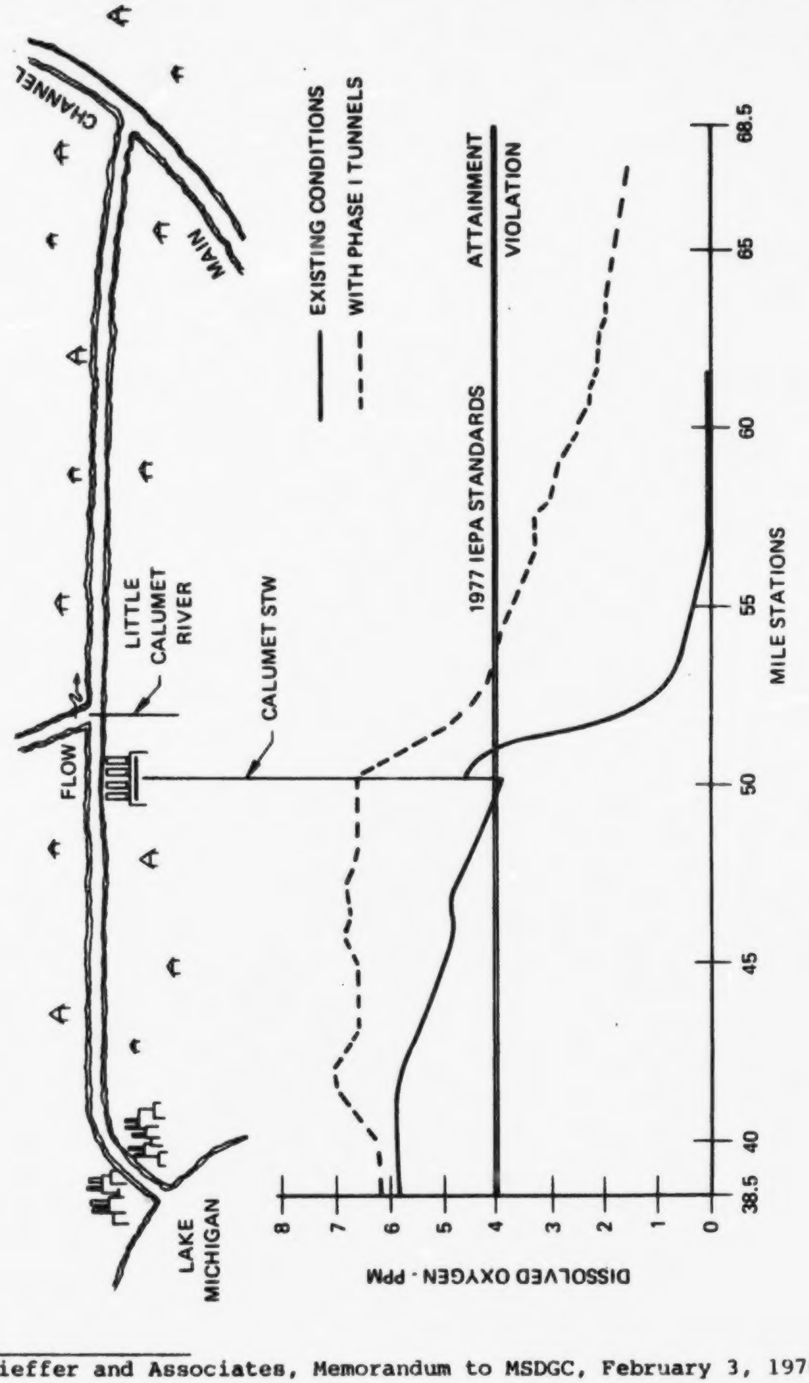
[1] Kieffer and Associates, Memorandum to MSDGC, February 3, 1976.

FIGURE VIII-3
Simulation of Dissolved Oxygen Concentrations Along the Calumet River System[1]



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[1] Kieffer and Associates, Memorandum to MSDGC, February 3, 1976.

Table VIII-2
Simulation Model Inputs[1]

Dry Weather, Existing Conditions

	North-Side Plant	West-South-West Plant	Calumet Plant	Lake Michigan
Flow (cfs)	505	1274	332	278
BOD (mg/l)	10	8	20	0
DO (mg/l)	7.0	7.0	7.0	6.0

Benthic Demands - Same as previously used by the MSDGC as a result of calibration of computer with measured instream DO.

Dry Weather, First Phase TARP

	North-Side Plant	West-South-West Plant	Calumet Plant	Lake Michigan
Flow (cfs)	505	1460	366	278
BOD (mg/l)	10	8	20	0
DO (mg/l)	7.0	7.0	7.0	6.0

Benthic Demands - Twenty percent of those used for existing conditions.

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[1] Westfall, D.E., Kieffer and Associates, Memorandum to the MSDGC, February 3, 1976.

and capture a significant portion of the 1,350 tons per year of phosphorus currently discharged to combined-sewer overflows by treatment plants, only about 20 percent[1] will be removed at the plant with current levels of treatment. The remaining 80 percent of the phosphorus will be released to the waterways until additional treatment is provided.

and capture a significant portion of the 1,350 tons per year of phosphorus currently discharged to combined-sewer overflows by treatment plants, only about 20 percent[1] will be removed at the plant with current levels of treatment. The remaining 80 percent of the phosphorus will be released to the waterways until additional treatment is provided.

Likewise, until the MSDGC's large plants are upgraded to provide tertiary-level treatment, restricted use standards for ammonia are not likely to be met even with the implementation of the tunnel system. Currently, the North-Side, West Southwest, and Calumet treatment plants will not be able to meet Illinois EPA standards, which go into effect by December 31, 1977. Ammonia in the effluent from the Calumet plan in particular is likely to cause violations of the Illinois Standards for Secondary Contact and Indigenous Aquatic Life along the Calumet River system. Effluent concentrations of ammonia from area treatment plants are shown in Table II-7, page II-37.

Construction of instream aeration stations, 75 percent funded by an Illinois EPA grant, is imminent. Operation of these facilities will have considerable benefit to DO levels. A recent study by the Harza Engineering Company[2] simulates Do levels in the North Shore Channel at Wilmette downstream in the Sanitary-Ship Canal to Lockport and the Calumet River, O'Brien Locks downstream in the Cal-Sag Channel to the junction with the Sanitary-Ship Canal, before and after operation of nine instream aeration stations. The effect on the modeled streams of instream aeration alone is very positive. Although instream aeration is far from adeaute to bring DO levels in "summer existing conditions" (dry weather flow) to standards, almost all zero DO levels are eliminated and many reaches are elevated from substandard concentration to meeting or exceeding the standards concentration.

The Harza study discusses briefly the effect on the Des Plaines/Illinois River Lockport to Chillicothe of three stages of development of MSDGC pollution control facilities: 1) Phase I TARP, (2 Phase I TARP plus nitrification at the major MSDGC plants, and (3 "Ultimate," i.e., all proposed MSDGC pollution control facilities, including all of TARP. These simulations show that, although each stage improves the DO of the Lockport to Chillicothe reach, violations of the DO standard will not be completely eliminated during the critical summer low flow, high temperature condition. The reasons for continuing problems are ammonia from MSDGC plants, reduced by nitrification but not eliminated, and benthic oxygen demand. The need for additional flow by Lake Michigan diversion would need to be evaluated further after several elements of TARP are operational and more accurate water quality data is collected.

Programs being considered to attain Illinois standards are: upgrading of existing treatment plants, use of instream aeration, and implementation of TARP Phase II. The water quality implications of these programs are discussed briefly below.

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[1] MSDGC Testimony, Hearing on the Proposed Chicago Tunnel and Reservoir Plan, Chicago, Illinois, March 28, 1974.

[2] Harza Engineering Company, "Evaluation of Water Quality of Chicago Area Streams," March 1976.

The increment of oxygenation provided by an instream aeration system in addition to the increment provided by the tunnel and reservoir system and the upgrading of MSDGC treatment plants would allow Illinois Secondary Contact and Indigenous Life standards to be met over the entire 80-mile length of the modeled rivers. The computer simulations of DO shown in Figures VIII-4, 5, and 6 assume 11 aeration stations over the modeled lengths of the Main Channel and Calumet River systems. The DO characteristics of the Des Plaines River system has not as yet been simulated by computer models. These characteristics, however, will be modeled in the near future by NIPC in their Section 208 planning efforts.

Upgrading of area treatment plants in conjunction with operation of the tunnels and reservoirs could have a significant beneficial effect on water quality during dry weather flow conditions. Upgrading to tertiary treatment with nitrogen and phosphorus removal would enable attainment of Illinois standards for ammonia and phosphorus in area waterways. In addition, DO concentrations would increase due to the absence of ammonia, although the improvement would still not be enough to meet DO standards along approximately 24 of the 80 miles, or 30 percent of the modeled waterways. Results of MSDGC computerized simulations of the impact of this combination on DO concentrations are portrayed in Figures VIII-4, 5, and 6.

The addition of storage reservoirs to the tunnel system would virtually eliminate release of combined-sewer overflows to surface waterways. With the tunnels and reservoirs on line, the MSDGC expects overflow events to be limited to three or fewer occasions over a 27-year period.[1] This would prevent violation of Illinois standards under wet weather flow conditions. State standards will still not be met, however, under the critical summer dry weather flow conditions, because of high ammonia and phosphorus concentrations in the effluent discharged from treatment plants, and because of the depletion of DO concentrations in the waterways. Implementation of the tunnels and reservoirs will still not enable attainment of the 1977 DO standard over roughly 40 of the 80 miles of waterways. The impact of the combination of the tunnels and reservoirs on DO concentrations is shown in Figures VIII-4, 5, and 6.

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[1] MSDGC, "Facilities Planning Study - MSDGC Overview Report," Revised January 1975.

Table VIII-3
Summary of Pollutant Concentration Ranges in Chicago's Surface Water Systems

Pollutant	Chicago River — Sanitary and Ship Canal System	Calumet River System	Des Plaines River System	Applicable Illinois Standards*	
				Secondary Contact	General Use
Dissolved oxygen (DO)	1.2 to 7.7 mg/l	3.9 to 9.0 mg/l	6.0 to 10 mg/l	5.0 mg/l^{1} 4.0 mg/l (1978)^{2} 3.0 mg/l 4.0 mg/l min.^{1} 2.0 mg/l min.	6.0 mg/l 5.0 mg/l min.^{3}
Biochemical oxygen demand (BOD)	5.2 to 9.2 mg/l	4.1 to 7.3 mg/l	5.0 to 6.7 mg/l	4-20 mg/l^{4}	4-20 mg/l^{4}
Ammonia (as N)	0.8 to 6.2 mg/l	1.3 to 13 mg/l	0.3 to 1.2 mg/l	4.0 mg/l (winter) 2.5 mg/l (summer)	2.6 mg/l^{3}
Suspended solids (SS)	19 to 54 mg/l	12 to 73 mg/l	29 to 68 mg/l	5-25 mg/l^{5}	5-25 mg/l^{5}
Fecal coliform	477 to 12,700 (counts/100 ml)	152 to 738 (counts/100 ml)	411 to 8,700 (counts/100 ml)	1000/100 ml^{1}	200/100 ml^{2}

* Effluent discharge standards apply if water quality standard is not designated.

1 North Shore Channel Standards

2 Chicago River-Sanitary and Ship Canal System and Calumet River system.

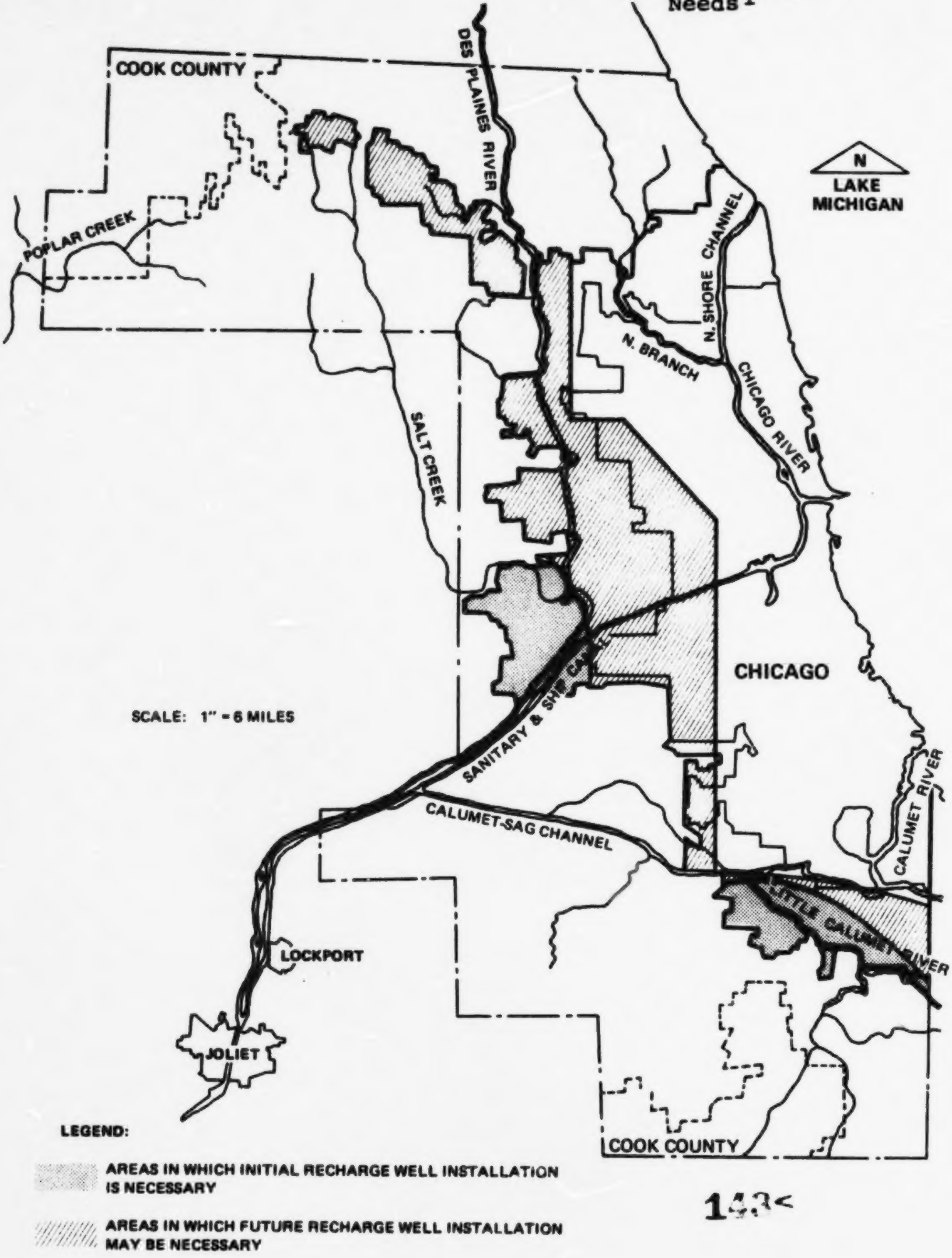
3 General Use Standard applicable to Des Plaines River system.

4 4 mg/l-Hanover, Egan, and O'Hare Sewage Treatment Plants
10 mg/l-WSW and Calumet Sewage Treatment Plant
20 mg/l-Lemont Sewage Treatment Plant

5 5mg/l-Hanover, Egan, and O'Hare STP
12mg/l-WSW and Calumet STP
25mg/l-Lemont STP

142<

FIGURE VIII-7
Aquifer Protection Needs[1]


COOK COUNTY
DES PLAINES RIVER
POPLAR CREEK
N
LAKE MICHIGAN
N. SHORE CHANNEL
N. BRANCH
CHICAGO RIVER
SALT CREEK
CHICAGO
SCALE: 1" = 6 MILES
SANITARY & SHIP CANAL
CALUMET-SAG CHANNEL
CALUMET RIVER
LITTLE CALUMET RIVER
LOCKPORT
JOLIET
COOK COUNTY
LEGEND:
▨ AREAS IN WHICH INITIAL RECHARGE WELL INSTALLATION IS NECESSARY
▨ AREAS IN WHICH FUTURE RECHARGE WELL INSTALLATION MAY BE NECESSARY

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[1] HEC, 1972

1,000 feet apart.[1] The system is designed to allow a water injection rate of 100 gpm which would result in an equivalent recharge amount of 0.73 MGD per mile of tunnel. Due to the variability of the aquifer, additional testing will be necessary during construction to delineate specific locations for recharge wells and to determine appropriate injection rates.

According to present plans, the proposed tunnel system will be situated beneath existing potable water main systems at a minimum vertical distance of 70 feet. In order to determine the potential for pollution of the potable water from exfiltration of the combined sewage, a "worst case" analysis was performed.[2] This analysis was based on the following assumptions:

- The sewage tunnel is unlined, and only major open joints have been grouted
- Pressure head in the sewage tunnel is the same as at land surface
- Ratio of horizontal to vertical permeabilities is one, $K_h/K_v = 1$, and permeability rate is 0.001 ft/min
- The water main is empty
- The concrete lining of the water main is damaged to the extent that it does not function as a seepage boundary.

The analysis indicated that even under such critical and unlikely circumstances, it would take approximately 280 days for the exfiltrated seepage to reach the water main, and the rate of inflow in the main would be about 0.07 gpm per foot of tunnel effected (or 0.5 MGD/mile).

It is extremely unlikely that this situation will occur. Based on the projected rate of flow of the sewage effluent, there would be sufficient time to implement mitigative measures in the event exfiltration occurs, providing observation wells are installed.

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[1] HEC, 1972.

[2] Ibid.

Ammonia concentrations of 2.5 mg/l[1] for the upgraded plants represent the minimum level that must be attained by the three major treatment plants by December 31, 1977 to meet Illinois Effluent Discharge standards. In addition, under these standards, BOD levels from MSDGC plants must be limited to no more than 10 mg/l by December 31, 1977. The projected improvement in BOD levels beyond the mandated limit due to plant upgrading is a result of MSDGC's comparison effort to meet DO standards in the waterways by limiting BOD releases from MSDGC treatment plants. Currently, Illinois has no BOD standards for waterways.

At this time, insufficient information on the design and operation of the reservoir storage systems is available to enable a determination of the effect of variable dewatering rates on the quality of treatment plant effluent.

8.1.4 Water Management Programs

Improvements in water quality resulting from operation of the tunnel system are, in general, consistent with the aims of other area water management programs. The tunnel system, in conjunction with a water storage system, is widely recognized in virtually all area plans as a necessary component to control pollution and flooding problems in the Chicago area. Although the tunnels alone would not attain fully the goals of the various programs identified in Section 2.1.4, operation of the tunnels without the reservoirs would enable pollution control aims to be at least partially accomplished.

A decision to construct the tunnel system prior to the completion of the 208 Planning Program would certainly reduce the options open to the 208 planning agency (Northern Illinois Planning Commission) in developing an areawide waste treatment management plan. With the commitment to a significant component of the TARP system, the potential utility and impact of the waterway monitoring and modeling to be

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[1] For waterways near or in the vicinity of communities with populations greater than 50,000.

Thus, about 20 percent of the sludge would go to the NuEarth Program and landfilling, and would remain in the metropolitan area. The consequence, for land use, would be consumption of some sludge disposal capacity at a rate somewhat greater than that under existing conditions. The increase in the rate of consumption of sludge disposal lands is balanced directly by the resultant decrease in the rate of solids deposited in the waterways. Since these solids would ultimately be dredged from the waterways and disposed of on land, the Mainstream Tunnel system would effect no change in the quantity of land used for sludge disposal.

9.3 FINANCIAL RESOURCES

This section addresses the potential economic impacts from the annual costs of operations and maintenance of the Phase I Tunnels (estimated at $13 million for all three tunnel systems). It addresses the impact of these costs on the household, commercial, and industrial sectors of the MSDGC. Economic impact is assessed in terms of its effects on the tax rate structure and the manner in which operations and maintenance costs are financed.

The current method for financing operations and maintenance costs of treatment facilities is an ad valorem tax. The District is authorized to levy an ad valorem tax for operations and maintenance in an amount not to exceed $.37 per $100 of assessed valuation. The 1975 MSDGC total tax rate of $.4005 per $100 of assessed valuation included a $.2523 per $100 of assessed valuation rate for operations and maintenance and a $.1175 per $100 of assessed valuation rate for construction. In addition to the ad valorem tax, industrial discharges are subject to an MSDGC user charge imposed through the adoption of an "Industrial Waste Surcharge Ordinance" by the MSDGC Board of Trustees, December 10, 1970.

In view of the requirement for a user charge system under PL 92-500 and the authority of the State of Illinois to impose one, the potential economic affects of financing additional annual operations and maintenance costs of $13 million must be addressed on the basis of a user charge method of financing as well as an ad valorem tax method.

Table IX-1 illustrates the impact on the MSDGC tax rate of the annual operations and maintenance cost associated with the Tunnel Plan (the portion applicable to the Mainstream Tunnel system is $2.3 million annually). Even on the basis of an extremely conservative posture (assuming that Phase I Tunnel operations and maintenance costs must be financed commencing FY 76 and that they are escalated annually by eight percent), the impact on the MSDGC tax rate is very modest. The projected incremental impact in FY 2000 is $.0703 per $100 of assessed valuation.

Table IX-1
1976 Estimate of the Change in Property Tax Rate Attributable to the Operations and Maintenance Costs Associated With the Tunnel Plan

Fiscal Year	Annual Cost of Tunnel Plan Operations Maintenance ($ Millions)	Incremental Change in MSDGC Tax Rate /$100 Assessed Valuation
1976	1.0800	.0449
1977	1.1664	.0457
1978	1.2597	.0466
1979	1.3605	.0476
1980	1.4693	.0484
1981	1.5869	.0493
1982	1.7138	.0502
1983	1.8509	.0512
1984	1.9990	.0521
1985	2.1589	.0531
1986	2.3316	.0541
.	.	.
.	.	.
.	.	.
2000	6.8485	.0703

Assumptions:

- TAX BASE (22.7 billion in 1975) is escalated at six percent annually
- Operations and maintenance costs are escalated at eight percent annually.

Economic impacts of operations and maintenance funding on a user charge basis as opposed to an ad valorem tax basis cannot be quantitatively addressed at this time. Region V EPA has awarded two grants to the MSDGC for the development of a user charge system to comply with the requirements of PL 92-500; however, the contractor has not yet made a definitive set of recommendations to the District concerning a viable user charge system. Historical experience indicates that the final user charge system will probably be based on water usage with several categories of user charge schedules. Tentative indications from the District suggest that the relative proportions of annual operations and maintenance costs currently financed by households as opposed to commercial and industrial users will be significantly shifted when the change from an ad valorem tax basis to user charge financing basis takes place. Under the current scheme (ad valorem tax), all property owners and properties pay the same MSDGC tax rate; however, assessments are divided into five major categories which include:

- Vacant land - assessed at 22 percent of market value
- Single family property - assessed at 22 percent of market value
- Rental income property - assessed at 33 percent of market value
- Commercial, industrial property - assessed at 40 percent of market value
- Miscellaneous property - assessed at 30 percent of market value.

Thus, industrial and commercial properties pay almost double the rate of households. The ultimate user charge system selected will very likely result in household/residential users paying a higher user charge (per gallon of water) than industrial and commercial users. Thus, the total portion of annual operating and maintenance costs financed by households will increase under a user charge system. In view of the relatively modest size of the operation and maintenance costs associated with the Phase I Tunnels, it is extremely unlikely that the additional cost burden (resulting from the Phase I Tunnels) shouldered by households under a user charge system would cause any significant impacts on household disposable income. In terms of positive economic benefits, the user charge system will provide the financial incentive for water conservation and will slightly dampen the disincentive which ad valorem taxation presents to industrial and commercial expansion within the District.

construction activities, such as excavating and stockpiling, introduce the potential for sedimentation or siltation of waterways and additional sedimentation loading of existing sewer systems, especially in areas which have high soil erosion characteristics. For the 59th-to-Addison segment of the Mainstream Tunnel system, most of the 82 drop shafts and 5 construction shafts will be located along the tunnel route in paved, cemented, or otherwise impervious areas. Runoff carrying sediment from spoil material stockpiles and excavated areas potentially can enter the Sanitary and Ship Canal, the existing sewers, and the Chicago River. This effect, however, is expected to be short-term.

Silt and other pollutants present in effluents resulting from tunnel dewatering operations have a short-term adverse impact on water quality if the effluent is discharged directly into surface water systems. The 59th to-Addison Mainstream Tunnel segment is expected to have a maximum total flow of approximately 4 MGD resulting from groundwater infiltration. If the infiltrated water is pumped out of the tunnel segment and discharged directly into the Sanitary and Ship Canal or the Chicago River, water quality degradation of these surface water systems will temporarily be worse than existing conditions.

(2) Groundwater

Infiltration of groundwater from the upper aquifer into the tunnels will have a short-term adverse impact on the piezometric or hydraulic pressure of the aquifer, and a grouting program will be incorporated in the construction phase of the TARP tunnel systems to mitigate this effect. Without the grouting program, groundwater infiltration rates can be as high as 1.4 MGD per mile of tunnel, with the average infiltration rate of groundwater for the Mainstream Tunnel approximately 0.5 MGD per mile of tunnel. These rates are sufficient to reduce the upper aquifer pressure to a critically low level. To monitor grouting integrity during tunnel operation, the MSDGC will install a number of observation wells spaced at appropriate intervals along the tunnel route. The monitoring program provides a means to determine the extent of infiltration early so that appropriate mitigative measures can be applied.

Exfiltration of wastewater, as it is conveyed by the tunnel system, may have a long-term effect on groundwater

(2) Groundwater Quality

To detect any adverse water quality or quantity changes in the vicinity of the TARP Tunnel systems, observation wells will be constructed along the entire tunnel alignment. These wells will be installed at approximately one-half to three-quarter mile intervals. The minimum offset distance from the edge of the tunnel is approximately 30 feet to ensure that the well will be outside the grouted area. An adequate number of appropriately spaced observation wells have been installed along the Mainstream Tunnel route. However, the Lower Des Plaines and Calumet Tunnel routes will require additional wells.

The MSDGC is not planning to monitor groundwater quality along the Mainstream system. A routine program should be implemented in order to determine whether exfiltration or infiltration is occurring. The wells and the tunnel should be equipped with continuing water level recorders so that aquifer pressure can be correlated with tunnel pressure. In addition, the wells need to be sampled both weekly and after major storm events. The groundwater sampled should be analyzed for the following constituents on a weekly basis (minimum program):

- NH_3 (as N)*
- Total Bacteria Plate Count*
- Conductivity (or calculated TDS)*
- TOC (Total Organic Carbon).*

This monitoring program will provide sufficient data to detect any alterations in groundwater conditions (infiltration or exfiltration) and, thus, to enable mitigation of any adverse effects. Modification of the well spacing criteria may be necessary as the heterogeneity of the rock material changes. This will be dependent upon actual conditions prevalent at the time of construction and operation.

While large quantities of exfiltration are not likely, exfiltration is not impossible, particularly if seismic incidents damage tunnel linings. To evaluate the effects on aquifer water quality as well as water level fluctuations, sampling will need to be performed for parameters and at locations, depths and times to be determined by agreement between the MSDGC, the Illinois EPA, and the U.S. EPA. These monitoring design criteria will become conditions written into permits for construction

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* Analyzed weekly (all other biweekly).

and operation of the tunnels. In addition, the requirement for water quality monitoring will be a part of the special conditions for all grants made to the MSDGC for the Mainstream Tunnel system.

By monitoring the observation wells on a regular basis, potential for infiltration of groundwater into the tunnel system will be detected before it occurs. The primary measure used to prevent excessive groundwater inflow is the grouting program. Therefore, the grouting program must be extensive, and effective enough during the construction phase to limit the inflow to a maximum allowable daily rate of 500 gal./in. diam./mile of tunnel. In addition, grouting integrity will be maintained throughout the operational phase of the tunnel. Grouting will be done at maximum pressures to ensure that each grout hole is properly filled. This will prevent groundwater from reestablishing seepage paths toward the tunnel. Precise records of grouting will be kept for future reference. In unlined tunnels, any future rock falls will affect the integrity of the grout applied during construction. Should these rock falls occur in zones where extensive grouting was done, infiltration/exfiltration problems may become critical. Precise grouting records will assist in ascertaining such problems.

(3) Geology

Rock bolting, grouting, and tunnel lining will be the measures applied to prevent slaking and shale parting. Concrete tunnel lining appears to be the best deterrent procedure for reducing shale deterioration and will be used in most of the TARP tunnels. Concrete lining, however, is not expected to fully eliminate this problem.

A few published reports indicate that, for limited excavating operations, slaking of shale units can be controlled and even prevented by conditioning the ventilating air circulated through the underground chambers. Temperature must be maintained within a very narrow range and relative humidity must be high. While this procedure will be of great general assistance during construction, its effectiveness is not considered to be sufficiently proven for it to comprise a totally reliable scheme in itself.

XII. CONCLUSIONS AND RECOMMENDATIONS

The following is a summary of the principle conclusions of the Final EIS, as well as recommended and suggested mitigative measures.

1. Implementation of the Mainstream Tunnel system will significantly reduce the pollutant load in the Chicago waterways. These loadings will be reduced further with the implementation of the Calumet and lower Des Plaines Tunnel systems. Water quality will be enhanced further with the upgrading of MSDGC's treatment facilities and the construction of the flood control aspects of the Tunnel and Reservoir Plan.

2. Significant earthquake events could adversely affect tunnel alignment and tunnel lining. Smaller earth movements could also affect the lining and grouting of the tunnels. It is, therefore, essential that MSDGC's inspection and maintenance program be extensive enough to insure efficient operation of the system.

3. Rock falls and partings may occur particularly in shale formations during construction. Stabilizing measures such as rock bolting are proposed to mitigate the short-term construction problems, while concrete lining will be utilized for the long term. Even with these measures, shale deterioration will continue and the inspection program should take these sensitive areas into account.

4. The rock spoil excavated from the Phase I tunnels is not expected to be marketable. Evaluation of various disposal alternatives leads to the conclusion that adequate environmentally acceptable landfill sites are available to handle the volume of rock which will be generated by the Phase I tunnels under consideration. We will rely on existing local, state, and Federal regulations to insure that disposal takes place in an acceptable manner. Additionally the MSDGC will be required to inform USEPA of their spoil disposal program as it is developed through discussion with the Contractor. This will be a condition of any grant awarded to the MSDGC for the Mainstream Tunnel System.

5. Although an effective grouting program is proposed, it must be sufficiently flexible to respond to the actual conditions encountered during construction. Should the grouting not be sufficient, additional infiltration could adversely affect the hydraulic pressure of the upper aquifer.

Additionally, under surcharged conditions, exfiltration will occur, resulting in adverse impacts on the groundwater quality of the upper aquifer. Observation wells to monitor grouting integrity during operation are necessary along the entire tunnel alignment. An adequate number of wells are already in existence for the Mainstream Tunnel system. If pollutants are detected in the observation wells, additional mitigative measures must be implemented to protect the upper aquifer, including a groundwater recharge system. Chapter X discussed particular aspects of the monitoring program, which will be developed in conjunction with the MSDGC, IEPA and USEPA. This monitoring program will also be a grant condition.

6. Since the majority of the construction shafts and drop shafts are in close proximity to area waterways, runoff from these sites could adversely affect water quality. Berms will be constructed around stockpiles of construction materials and spoil materials to preclude runoff into the waterways.

7. It is presently proposed that water pumped from the tunnels during construction be discharged directly to the waterways after a period of settling. Since the possibility of silt and other pollutants still exists after settling, it is recommended that these dewatering flows be discharged to MSDGC's intercepting system for treatment, except during periods of combined sewer overflows. This will be a condition of any grant awarded for the Mainstream Tunnel System.

8. Although no known historic, architectural, or archaeological resources will be affected by the proposed project, the possibility of finding archaeological resources must be investigated by the MSDGC. This must be accomplished by contacting the State Historic Preservation Officer.

9. Conformance with applicable regulation of the Occupational Health and Safety Administration, U.S. Department of Labor, and the Bureau of Mines, U.S. Department of the Interior is essential for safety of construction workers.

10. A conflict exists between the location of several drop shafts and the plans for the Central Area Transit Project. The MSDGC must meet with the Chicago Urban Transportation District to resolve these conflicts.

11. There exists a wide range of potential adverse impacts which could develop during construction. This includes blasting, waste spillage, traffic congestion, light glare, and fugitive dust at construction and disposal sites. While these effects could be considered insignificant any measures taken to reduce their impact would aid in public acceptability of the project. These suggested mitigative measures are discussed in Chapter X.

Year	Month	Description of Events	Reports Issued
1973	July (Continued)	Preliminary plans for second phase Calumet tunnels, administration of subsurface exploration, and preparation of geotechnical design report for Calumet system initiated (MSDGC).	-
	-	Preparation of geotechnical design for Mainstream tunnels and two reservoirs initiated (MSDGC).	-
1974	April	Mapping of Mainstream, Calumet and Lower Des Plaines systems commenced (MSDGC).	-
	-	Subsurface exploration of Lower Des Plaines, Calumet, Upper Des Plaines, Mainstream and reservoir systems commenced (MSDGC).	-
	-	Reservoir sites proposed for O'Hare and Calumet areas (MSDGC).	-
	March-September	Drop shaft modeling studies completed and reports issued (University of Minnesota).	Anderson, A.G. and Dahlin, W.Q., Status Reports No. 1 through 6, for the city of Chicago.
1975	January	Drop shaft modeling study completed (University of Minnesota).	Anderson, A.G. and Dahlin, W.Q., "Model Studies of Drop Shafts, Final Report," University of Minnesota, for the city of Chicago.
	July	Hearings conducted by MSDGC pertaining to EPA construction grant for tunnels and shafts of Addison to Wilmette and O'Hare systems.	